"Reject Perfection."

The Impact of User Studies on Born-Digital Collections Access in Libraries, Archives, and Museums (LAMs)

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Abstract

Within the last five years, innovative technologies, standards, and resources have advanced born-digital access scholarship and practices in libraries, archives, and museums (LAMs). An emerging archival theory of practice, Participatory Archival Research and Development (PAR&D) frames an optimal practitioner participatory research environment needed to continue these advancements, especially for conducting essential born-digital access user studies in collecting institutions. The Digital Library Federation (DLF) Born-Digital Access Working Group (BDAWG) provides an inclusive, academic space to which 'Reject Perfection' is the first core value. Library and archive professionals have embraced this philosophical paradigm, incorporating user experience assessments into born-digital access workflows to understand and improve user experiences. Have these studies improved access practices and user experiences? Are there barriers to access that the studies identify? This paper investigates four user studies conducted between 2015-2020 to benchmark the current born-digital collections access landscape through both practitioner and researcher user experiences. Ten LAM professionals, who participated in open-ended interviews, assist in recommending improvements to access and provide strategies for creating a cultural mindset that values user studies. Through shared communities of practice and cross-disciplinary collaborations, especially with museums, the commitment to LAM convergence will actively steward the scholarship needed to develop and sustain 'best' or 'good enough' born-digital access practices and implementation of user studies.

Keywords: LAMs/LAM, born-digital, access, user studies, communities of practice, convergence

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> **Reject perfection.** Perfectionism is exclusionary, hinders research, and inhibits our ability to meet direct needs. To provide access to born-digital materials, we must reject perfection and cultivate action … Continually adapt to researchers' needs.
>
> – *The Digital Library Federation Born-Digital Access Working Group Access Values*

Formed in 2017, the Digital Library Federation (DLF) Born-Digital Access Working Group (BDAWG), which "produces research on and advances the practice of providing access to born-digital collections" (DLF, 2020, para. 1), published its first Access Values statement in September 2020. The statement exemplifies BDAWG's continued contributions of considerable scholarship on born-digital collections access and outreach researched by library, archive, and museum (LAM) practitioners. This innovative and diverse pool of practitioners, champions LAM convergence to improve better access tools and share resources for working with born-digital materials in collecting institutions. BDAWG expects: "That it [statement] will evolve as members of the community interact with this document, and as methods and ideas about access to born-digital materials change" (Farrell et al., 2020, Sustainability Plan section). The Access Values statement resonates with its forward-thinking creators – that providing successful access to born-digital materials is a continually emerging practice and warrants experimentation within collecting and processing principles. Through instituting various means of technologies, standards, workflows, and other types of tools developed to aid the user, adaptability, and flexibility are paramount.

As the influx of born-digital materials enters collections in various formats, such as electronic documents, legacy source media, new media, and web archives, managing and preserving these materials is only part of digital curation principal activities. LAMs must ensure that access to born-digital content constitutes a successful experience with limited technological and descriptive barriers for optimal discoverability. However, what are barriers to access, and how do LAM practitioners know if access to born-digital materials is successful for researchers and other end-users? These questions turn to user studies for answers.

Born-digital access theoretical and practical frameworks and tools to improve access, such as accessioning workflows, descriptive metadata standards, onsite and online virtual reading rooms, and digital archive access, have accelerated in development. A significant component of these developments is evaluating user experiences by conducting user studies, usability studies, and user experience (UX) testing. However, their impact on born-digital access practices is unknown, which poses the questions:

- How have user studies influenced born-digital collections access practices and, ultimately, user experiences?
- What types of access barriers continue to affect institutional practices and user experiences that user studies identify?
- How can LAMs build a cultural mindset valuing user studies within practices to improve born-digital collections access and user experiences?

A fresh approach to archival research and development blending theory and practice, developed by members of BDAWG called Participatory Research and Development (PAR&D), allows the space to cultivate a mindset and culture that encourages exploratory studies to benefit a broad range of communities. Thus, in the spirit of PAR&D, this paper offers an introductory

exploration into user studies for born-digital collections access by identifying various technologies, standards, and resources designed to enhance user access. The author analyzes four user studies conducted between 2015-2020 and shares the perspectives and insights on the subject by ten field professionals gathered from a series of informal, open-ended interviews. Together, these research methods will benchmark the current LAM born-digital collections landscape to determine the influence of access user studies and illustrate how PAR&D across disciplines affords sustainable, born-digital access stewardship through holistic and convergent communities of practice.

Born-Digital, Access, and User Studies – Defined in Context

Framed in the context of this study on the impact of user studies on born-digital collections access are the terms *Born-Digital*, *Access*, and *User Studies*.

Born-Digital

Digital library pioneer Ricky Erway published the first of many reports, guidelines, and articles dedicated to born-digital collections and the library and archive fields' advancements focused on managing and providing access to born-digital materials. Erway's 2010 publication *Defining 'Born Digital'* intended to: "Define 'born digital' and the various types of born-digital materials ... to improve community discourse by encouraging caretakers of born-digital resources to specify what they mean when they use the term. Born-digital resources are items created and managed in digital form" (Erway, 2010, p. 1). Born-digital materials are known not to have a 'physical' or 'analog' counterpart. They consist of digital photographs, electronic documents, and records (i.e., government documents, electronic archives, organizational documents, email). Included are digital documents (i.e., Microsoft Word, Excel, PDF), harvested web content (i.e., web crawls), digital manuscripts, static data sets computed

and saved in software, and digital art, and digital media publications. Sometimes born-digital materials are characterized as dynamic data that is 'active.' The software and hardware that house data, as well as the data, require sustainable preservation maintenance (Erway, 2010, p. 1-4). Erway shares the many challenges to preserve born-digital materials and the threats that minimize their authenticity and integrity, such as bit-rot and obsolescence of software, hardware, and media formats.

Access

DLF-BDAWG defines providing access in the realm of born-digital collections as: "Access to archival materials in any format requires finding a balance between two responsibilities. First, to provide equitable and open access to collections for current researchers. Secondly, to take necessary security measures to protect and preserve the integrity of collections so that they will continue to be available for future researchers" (Arroyo-Ramírez et al., 2020, p. 1). Best defined in this context is Access within the recent contribution to born-digital access scholarship, *Levels of Born-Digital Access*, the recent winner of the Digital Preservation Coalition (DPC) 2020 Software Sustainability Institute Award for Research and Innovation (see Appendix A). Here, measured among various levels of access to born-digital materials are five areas: Accessibility, Description, Researcher Support & Discovery, Security, and Tools, with "three levels of complexity, from minimal to advanced" (Arroyo-Ramírez et al., 2020, p. 1). Meant for practitioners "who possess a baseline understanding of digital archives tools and concepts" (Arroyo-Ramírez et al., 2020, p. 3):

> [The levels] are not meant to be prescriptive or immutable ... [they] provide a set of format-agnostic baseline practices for born-digital access, laying out concrete and

> actionable recommendations that individual institutions can consider implementing according to their needs, resources, and abilities. (Arroyo-Ramírez et al., 2020, p. 3)

The DLF-BDAWG Exploring Ideal Access Systems subgroup's Ideal Access System Definition is a living document. It "will support all who use born-digital archival material—ranging from researchers from all walks of life to information science professionals—by guiding the design of tools, platforms, and systems that enable users to experience ideal access to born-digital content (BDAWG, 2020, para. 1). Here, the ideal access system for born-digital materials:

- "Centers user experience and provides an inclusive space for a range of different users
- Facilitates ongoing discovery
- Is customizable to various contexts and scales" (BDAWG, 2020, para. 2).

User Studies

User studies are different from usability studies and user experience (UX) testing, focusing on web access capabilities and navigation of users within a web interface. "User study means an archival investigative activity that collects, analyzes, and interprets data on users and use by empirical research methods" (Rhee, 2015, p. 30). User studies can incorporate a variety of methods tailored to institutions' needs. The surveys analyzed in this paper lean more toward a qualitative approach to the data sets. Free text comments and Out Loud protocols are most effective in the surveys' output. However, quantitative measures supply informative data sets, which, arguably, are more authoritative. A hybrid approach to user studies attempts to balance both a statistical and emotive description to analyze how users experience their access to born-digital collections. According to Rhee (2015):

> Information seeking is the most popular topic of archival user studies. Specific topics include the archival material that users seek as well as their access tools, access problems,

> strategies for locating archival materials, interactions with archivists, preferred format of information sources and materials, and information-seeking activities. Most user studies on information seeking focus on users' information-seeking behavior while few deals with user cognition. (p. 33)

Born-Digital Access Theoretical and Practical Framework

Fellow Master of Library and Information Science (MILS) graduate students from the University of Texas at Austin School of Information between 2010 and 2012 continued their personal and professional connections in the library and archive fields after graduation. Although these four research innovators, Rachel Appel, Alison Clemens, Wendy Hagenmaier, and Jessica Meyerson, work in different areas and institutions across the country, their collaboration has paved the way for other practitioners to follow regarding research and development practices embedded within LAMs.

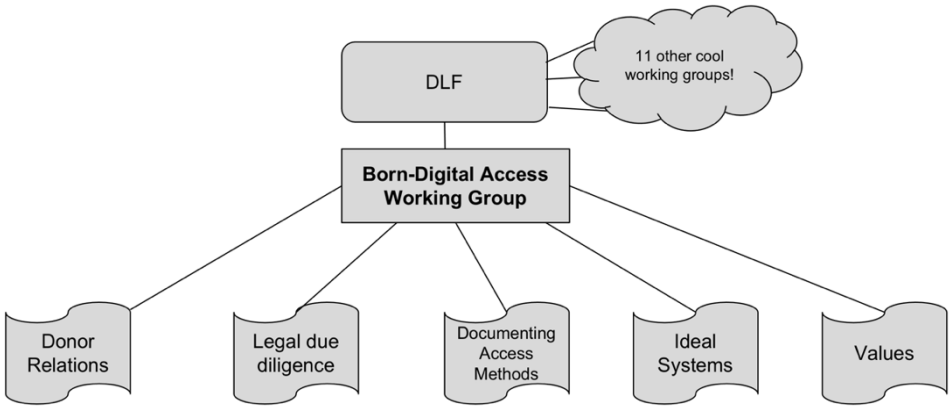
Frustrated by recognizing and acknowledging a gap in research on born-digital access focused on user experiences, Appel approached her colleagues to generate their brand of a research initiative as their "goals evolved beyond the scope of collecting and publishing a static data set. We were inspired by models of research in practice, participatory action research, and research and development to use the data to kickstart collaborative progress towards the future of archival practice" (Appel et al., 2020, p. 4). Thus, the Participatory Archival Research and Development framework (PAR&D) materialized. It provides the foundation for this investigation on the impact of user studies on born-digital collections access. Their research, featured in their white paper published in *Provenance, Journal of the Society of Georgia Archivists* in April 2020, advocates creating an inclusive and sustainable culture of research and allows room for reflection and innovative practices. As Appel et al. (2020) state:

> If the values of trust and sustainability are at the core of our professional mandate to preserve cultural heritage, we argue that reflexive research in practice should be a necessary component of archival work: research with a reflexive orientation necessitates critical self-evaluation, at the levels of the research-practitioner, the institution, and the profession. ... The archives profession faces urgent challenges – from archival silences to the rapid pace of technological change, from unsolved questions of storage and security to the potential threat of climate change to our collections, and beyond. These challenges demand that practitioners expand our ideas and experiences and that we add new tools to the 'archival repertoire,' growing our capacity for knowledge creation that fuels practical progress. (p. 5)

Appel et al. share their research experience that turned into facilitating 'Hackfests' at conferences, such as at the Society of American Archivists (SAA), and organized Born-Digital Access Bootcamps. Practitioners across the country and in other countries came to join the DLF-BDAWG (see Figure 1), which models PAR&D (see Appendix B). PAR&D equals the future in adopting "existing models of open, participatory research production and publication that inspire reuse and concrete progress ... [And the] unmet demand in the field for more flexible models of continuing education that foster learning, discussion, and communities of practice around emerging research" (Appel et al., 2020, pp. 19-20). Hopefully, PAR&D is the 21st-century paradigm shift in research practices for LAMs that can change the course of how research and practices advance for the benefit of both practitioners and users.

Figure 1

Digital Library Federation (DLF) Born-Digital Access Working Group (BDAWG) Active Working Groups



Cobourn, A., & Farrell, J. (2020, August 5). *Participatory archival research and development in action: Updates from DLF's BDAWG* [PowerPoint slides]. Archives Records 2020: Virtual Joint Annual Meeting of the Council of State Archivists and Society of American Archivists (SAA-CoSA). https://www2.archivists.org/am2020/research-forum-2020/agenda

Literature Review

Since the mid-2000s, a broad scope of scholarship dedicated to managing born-digital materials in collections has shaped current LAMs studies on born-digital access. These resources balance both theoretical and applied scholarship addressed separately to grasp the breadth of literature published, especially since 2010. The practices of conducting born-digital access user studies become a more significant component of access scholarship. Understanding the management of born-digital materials and emerging technologies, standards, and resources developed to improve access is necessary. The Annotated Bibliography (see Appendix I) provides a more extensive literature review. It is important to note that not discussed in this paper are born-digital artworks designated as time-based media and new media – different 'beasts' regarding preservation and access. However, managing born-digital collections in

museum archives emulate library and archive practices but come with other challenges later addressed in the Discussion subsection, *What About Museums?*

Born-Digital Collections Access Scholarship

Taking our pulse: The OCLC research survey of special collections and archives (2010) by Jackie M. Dooley and Katherine Luce, is a re-vamp of a survey regarding special or 'hidden' collections and their discoverability conducted by the Association of Research Libraries (ARL) in 1988. Dooley & Luce (2010) summarize that "the top three 'most challenging issues' in managing special collections were space (105 respondents), born-digital materials, and digitization" (p. 9). Regarding Born-Digital Archival Materials, Dooley & Luce (2010) conclude that "the data clearly reveal a widespread lack of basic infrastructure for collecting and managing born-digital materials ... Clearly, this activity has yet to receive priority attention due to its cost and complexity" (p. 13). Their recommended action steps included defining born-digital archival materials as 'special collections,' forming 'basic steps' to manage materials in the most responsible means and developing "use cases and cost models for selection, management, and preservation of born-digital archival materials" (Dooley & Luce, 2010, p. 13). This game-changing report provides the foundation of born-digital collections management that defines the next decade of action.

The digital publication from the Association of Research Libraries (ARL), *SPEC Kit 329: Managing born-digital special collections and archival materials* (2012) shares a thorough analysis of an extensive survey conducted in response to Taking our pulse. The survey indicates that, at the time, "there is not one, single repository system being used to manage or provide access to born-digital materials ... and the biggest access and discovery challenge ... is the sensitivity of materials – concerns about copyright, confidentiality, privacy, intellectual property,

and personally identifiable information ... IT infrastructure, or rather, lack of it" (Nielsen et al., 2012, p. 17). Spec Kit 329 indicates movement towards standardizations, institutional buy-in, and supporting access for user needs, and mentions the future inclusion of "the use of analytics and user studies to track the quantitative and qualitative aspects of access to these materials by off-site researchers and the challenges of providing not just basic access but value-added reference services to those users" (Nielsen et al., 2012, p. 17).

Finding and Addressing the Gaps: Two Evaluations of Archival Reference Services (2012) authored by Belinda Battley & Alicia Wright from Archives New Zealand, focused on access to archival materials, not necessarily born-digital materials, and experimenting with questionnaires that "measured gaps between user expectations and experiences... and a 'mystery shopper' methodology, with predetermined scenarios and score sheets" (Battley & Wright, 2012, p. 107). They intended to benchmark existing reference service protocols and 'relationships' with users to "develop an organization-wide service improvement plan" (Battley & Wright, 2012, p. 107). Battley & Wright (2012) conclude that the combination of the methodologies "resulted in measurable improvements to our services to users, and the benefits of our services could be demonstrated to our funders, supporters, and a wider community" (p. 121). They mention that the lack of user studies in the archival field is noticeable and similar studies shared as case studies would benefit the archival community at large.

The Archival advantage: Integrating archival expertise into the management of born-digital library materials (Dooley, 2015) highlights how managing born-digital materials, especially in the categories of email, websites, and research data, can be directed by archivists who are able to add contextual value and processing expertise to the handling of these materials for optimal preservation and access. Dooley (2015) introduces 'ten areas of archival expertise'

and thoroughly describes the relationship of each to managing digital content, and stresses that "the inclusion of archivists in management of born-digital materials will help us meet the needs of creators, users, and research library professionals, today and into the future" (p. 24).

Demystifying IT: A Framework for Shared Understanding between Archivists and IT Professionals (Shaw et al., 2017) is a companion report to The Archival advantage in which Dooley comments in the Forward:

> Digital archivists have expressed a need for guidance in many other areas, one of which is to gain a better understanding of how to work successfully with colleagues in information technology. The two professions have a deep need for collaboration but have different work cultures and take different approaches to work tasks such as project management. (Shaw et al., 2017, p. 5).

Demystifying IT embraces the development of a "*culture of collaboration*" (Shaw et al., 2017, p. 8). It lays out the framework with which both IT professionals and archivists need to establish while working together as "both archival management systems and born-digital materials require more extensive applications of technology throughout all phases, from appraisal through processing, and from preservation to end-user access" (Shaw et al., 2017, p. 25).

Emerging Access Technologies, Standards, and Resources

Born-digital access scholarship features the many emerging practical tools needed to not only maintain the trustworthy nature of born-digital materials, their integrity and authentic essence, but to provide LAM professionals with the tools to process these materials, and for the user, access to content that is broadly searchable and format accessible. Most importantly, tools that equip the user with the knowledge they need to confidently search and access materials with

limited barriers that hinder their experience. The following technologies, standards, and resources illustrate advancements the field.

Digital forensics and born-digital content in cultural heritage collections (Kirschenbaum et al., 2010) builds on the research of Elizabeth Diamond in the 1994 article in *Archivaria*, The archivist as a forensic scientist. Seeing ourselves in a different way, and Luciana Duranti in the 2009 article also in *Archivaria*, From digital diplomatics to digital records forensics. Here, Kirschenbaum et al. (2010) state:

> Digital forensics is an applied field originating in law enforcement, computer security, and national defense ... discovering authenticating, and analyzing data in digital formats to the standard of admissibility in a legal setting ... the methods and tools developed by forensics experts represent a novel approach to key issues and challenges in the archives and curatorial community. (p. 1).

Primarily intended for cultural heritage professionals who are beginning to work with born-digital materials entering their collections, this work defines the challenges with "issues ranging from how to identify and capture digital cultural heritage (and the related ethical concerns); to technical questions related to data integrity, accessibility, and recovery; to concerns about the cost of digital preservation projects ..." (Kirschenbaum et al., 2010, p. 14). Kirschenbaum et al. (2010) conclude: "The custodians of the born-digital cultural record can and will continue to build on the base of achievement that has come to them from diplomatics, archival practice, textual scholarship, and scientific method" (p. 62).

Cal Lee et al. (2013) From bitstreams to heritage: Putting digital forensics into practice in collecting institutions, is the first 'product' of the BitCurator project. It documents project activities to date, especially in building 'institutional capacity' through symposiums, lectures,

and other professional events, introducing hackathons. Lee et al. (2013) final reflections focus on the user in mind:

> Digital forensics is not only an aid for professionals processing collections, but also a service to a future in which we are unable to anticipate the needs and desires of the patrons of those collections ... the digital environment affords multiple opportunities for interacting with information at various levels of representation ... LAMs and the researchers who use them can explore a variety of access methods in order to best meet their needs and interests. (p. 32)

SCOPE: A digital archives access interface (Stewart & Breitwieser, 2019) highlights the Canadian Centre for Architecture (CCA) Archaeology of the Digital project, initiated in 2012, created to tackle the driving questions, "How did the introduction of digital technology, affect architecture and architectural practice? How do we process, preserve, and make accessible more than 5TB of complex born-digital archival materials?" (Stewart & Breitwieser, 2019, para. 3). Former CCA digital archivist Tessa Walsh developed "a suite of open-source tools used for digital archival processing" (Stewart & Breitwieser, 2019, para. 4) along with Artefactual Systems, which led to the digital archives access interface, SCOPE, a free, open-source tool available from GitHub. SCOPE (see Appendix C) "allows for granular file-and-item-level searching within and across digital archives, and lets users download access copies of the collection material directly to a local machine" (Stewart & Breitwieser, 2019, para. 1).

Princeton University Library's digital and project archivists, Annalise Berdini and Kelly Bolding, shared their work in collaborating with their IT department on developing a virtual reading room at the inaugural DLF-BDAWG Colloquium in August 2020. Berdini & Bolding (2020) state:

> While we've long dreamed of building a virtual reading room to provide broader access to our collections, the pandemic and the subsequent shift to virtual learning has renewed the library's focus on digital access ... to implement virtual reading room functionality for both born-digital and digitized materials within our existing, local and digital repository. (26:39-27:01)

Building upon an existing infrastructure for born-digital collections access within reading room laptops and finding aid links to content in Princeton Library's file management system, Webspace, the library migrated to a digital repository "homegrown system" (Berdini & Bolding, 2020, 32:13), Figgy. Figgy provides "tiers of mediated access" (Berdini & Bolding, 2020, 32:30) to include born-digital materials, and will soon offer a controlled digital lending service, "which will give us even more control over the types of sharing that we can do" (Berdini & Bolding, 2020, 34:08-34:13), (see Appendix D).

With varying technologies and processing workflows coming into play for managing born-digital materials and their access, addressing standards for describing born-digital materials is a significant and necessary development for enhancing finding aids. A group of University of California Library archivists designed and implemented the first set of archival descriptive elements that fills the 'born-digital' gap in worldwide archival description standards. The archivists' "shared the conviction that such a resource would harmonize and align disparate descriptive practices and ultimately improve the overall quality of the finding aids we produced throughout the UC system" (Berdini et al., 2018, p. 3). The UC guidelines for born-digital archival description (UC Systemwide Libraries, 2017) is the formally approved UC-wide standard shared with the public to provide a model for documenting deeper levels of metadata granularity within born-digital and hybrid collections data and finding aid content (see Appendix

E). As a profound standards tool to enhance access, the Guidelines are the working foundation many academic institutions model their born-digital archival descriptive elements, such as the University of Buffalo Libraries, Yale University Library and their Born-Digital @ Yale program, and Northwestern University Distinctive Collections Art Library, University Libraries.

Adopting the mindset to not reinvent wheels, LAM professionals have actively collaborated with a number of organizations, such as the Educopia Institute, to design and distribute open-source software (OSS) resources for managing born-digital materials. The OSSArcFlow: Guide to documenting born-digital archival workflows (Chassanoff & Post et al., 2020) is the resource born through the OSSArcFlow project conducted between 2017-2020 "to encourage and assist collecting institutions of all shapes, sizes, and types to begin documenting their born-digital workflows ... aim[ing] to make the daunting task of selecting, implementing, and refining born-digital archiving workflows more achievable" (p. 3), (see Appendix F).

The collaboration between University of California Santa Cruz (UCSC) Supervisory Archivist, Kate Dundon, and User Experience and Web Librarian, Jess Waggoner, produced a wealth of knowledge regarding an approach to understanding how users access born-digital collections by searching within the catalog or finding aids and accessing materials on a laptop in the reading room. They shared their discoveries and tools with the BitCurator community at the virtual BitCurator Users Forum (BUF), October 2020. In From request to access: Evaluating born-digital access, Dundon & Waggoner highlighted incorporating usability and UX studies designed by Waggoner to benchmark and improve UCSC Special Collections & Archives' user experiences and access to born-digital materials. Dundon reviewed how her staff processed and provided access to born-digital materials, which led to the development of Born-Digital Access User Guides for both staff and researchers, the Born-Digital Access Policy, Frequently Asked

Questions, and an Exit Interview. Waggoner's department helps to "uncover pain points and make recommendations for enhancing user experience" (Dundon & Waggoner, 2020, Slide 4). She transformed her 'Journey Maps' used for assessing researcher experiences accessing physical archives to support "a lightweight usability study on the [Dundon's] born-digital workflow and access laptop" (Dundon & Waggoner, 2020, Slide 3), (see Appendix F). Dundon & Waggoner's collaborative undertaking, although within one institution, provides another achievable model for providing better access resources for both staff and researcher as well as for templating Journey Maps in the context of user studies for born-digital collections.

It is evident that born-digital access scholarship and the tools to implement access through technologies, standards, and resources have increased in volume along with the increase of materials within collections to manage. Where does the user experience fit within studying born-digital access, and what are LAMs doing to make room for conducting user studies? Without the efforts of a small collective of LAM change agents, the foundations of current born-digital access user studies would fail to exist. What are these studies and what are their impact in LAMs?

Methodology

To answer these questions, the author investigated user studies that represent the tipping point to understanding the user experience on born-digital collections access within LAMs through a research design including meta-analysis and open-ended interviews.

Meta-Analysis

A meta-analysis of four born-digital collections access surveys conducted between 2015-2020 by various LAM field experts investigates and determines whether or not the survey outcomes and collected data sets focused on 'discoverability' reveal impacts to LAM current

strategies for access with the data provided to benchmark the current landscape. The meta-analysis leads to a proposal of suggested strategies to improve or refine LAM user experience studies to improve access practices to continue to understand users of born-digital collections. The four surveys:

1. Access to born-digital cultural heritage materials survey (Hagenmaier et al., 2015)
2. Canadian Centre for Architecture (CCA) access to born-digital archives user survey (Walsh, 2017)
3. Researcher access to born-digital collections: An exploratory study (Kim, 2018)
4. Collecting user experiences, needs, and desires for accessing born-digital archival collections (Clemens et al., 2020)

Open-ended Interviews

A series of open-ended interviews enhance this meta-analysis. They feature authors of the conducted surveys and other LAM professionals who have been a part of the development of various technologies, standards, and resources advancing the fields in digital collections, born-digital access, and communities of practice (see Table 1). The open-ended interviews provide personal and professional insights into why born-digital collections access to users is critical to the discoverability of collections through the improvements made to enhance user experiences and how practitioners can leverage user studies to develop resources and sustain long-term user study practices. The author attempts to gather this qualitative data in the spirit of *phenomenology*, which "examines the representation of an entity as a thing unto itself (*a priori*, independent from experience) and entities understood based on experience (*a posteriori*, empirical). It centers participants' collective experiences – that is, what they have in common – as a basis for forming conclusions about the phenomenon" (Blumenthal et al., 2020, p. 13). Here,

the *phenomenon* is the impact user studies affords managing born-digital collections access and what strategies will help develop a collaborative culture for conducting user studies within LAMs. The use of phenomenology will also garner a more holistic, narrative perspective from the respondents who come from a broad range of LAM professional experiences.

Applying an informal approach to the phenomenological methodology, respondents agreed that the author could use their names. However, their responses are within a professional-personal capacity and do not necessarily represent their respected institutions' views. Interviews were conducted via Zoom, the video conferencing platform, with one respondent submitting answers to their questions in a Microsoft Word document. Participants received the interview questions before the arranged meeting date. However, the meetings constituted a casual format to generate a more dialogic experience for both parties (see Appendix H).

Table 1

Born-Digital Collections Access Open-ended Interview Respondents

Respondents	Position/Institution
Alison Clemens	Head of Processing, Manuscripts & Archives, Yale University
Tessa Walsh	Software Developer, Artefactual Systems
Jess Farrell	Community Facilitator, Educopia Institute
Wendy Hagenmaier	Digital Collections Archivist, Georgia Tech Library
Cate Peebles	Museum Archivist, Yale Center for British Art
Julia Kim[1]	Digital Projects Coordinator, National Library for the Blind and Print Disabled, Library of Congress
Liz Galvin	Head of Learning and Digital Projects, Victoria and Albert Museum
Brian Dietz	Digital Program Librarian for Special Collections, North Carolina State University Libraries
Kate Dundon and Jess Waggoner	Supervisory Archivist; User Experience and Web Services Librarian, University of California, Santa Cruz Library

[1] Julia Kim contributed the open-ended interview for this paper in her personal capacity. The views expressed are her own and do not necessarily represent the views of the Library of Congress as an agency of the legislative branch of the U.S. government.

The data collected from using meta-analysis and open-ended interviews is also supported by the historical research shared in the Literature Review, the Annotated Bibliography, and Additional Resources (see Appendix J) that illustrates the evolution of born-digital scholarship and the technologies, standards, and resources developed in response to access and user needs.

Born-Digital Collections Access User Studies, 2015-2020

Access to Born-Digital Cultural Heritage Materials Survey (2015)

"The right thing at the right time." – Alison Clemens, 2020

Lim Rhee (2015) reflects that the "most important function of archival institutions, traditionally, is preservation of rare or unique materials, not user service ... archival institutions seem not to have sufficient resources, including staff time to conduct user studies ... [and] place more value on processing and description than on conducting user studies" (p. 31). This observation could also apply to born-digital materials and understanding user access. However, at the time of Rhee's published article, the user studies landscape began to shift with the emerging of PAR&D and user studies for born-digital collections access.

Seeded by Appel in 2014, addressing born-digital access by the 'collaborative' including Clemens, Hagenmaier, and Meyerson, evolved because "there wasn't a sense at all of how people were, across the board, trying to provide access to this material" (A. Clemens, personal communication, October 1, 2020). Their motivated curiosity resulted in conducting the first practitioner survey of its kind "to advance the professional discourse around establishing best practices for access to born-digital archival collections" (Appel et al., 2017, para. 1). The first of two parts, the survey design blends "a mixed methods approach ... strengthen[ing] the reliability of research findings by comparing qualitative and quantitative data" (Appel et al., 2015b, p. 4). The University of Texas acted as host to the survey tool using Qualtrics Experience Management

(XM). The University of Texas at Austin Institutional Review Board (IRB) provided review and approval, and the survey collaborative included “the IRB-approved informed consent form including:

- Description of the study
- Any risks and benefits to participants
- Plans for publication
- Assurances regarding privacy and confidentiality" (Appel et al., 2015b, p. 5).

Intended mostly for archive practitioners and recruited through professional listservs, such as the Society of American Archivists (SAA) Electronic Records section, the Digital Library Federation, and the National Digital Stewardship Alliance (NDSA), the survey instrument included “36 questions, total, divided into four sections: Background Information, Staffing and Training, Activities, and Future Data Collections” (Appel et al., 2015b, p. 5), which allowed room for free-text responses through additional “semi-structured interview questions” (Appel et al., 2015b, p. 5). One hundred twenty-nine responses were received in which these respondents represented mostly ‘college and university archives.’

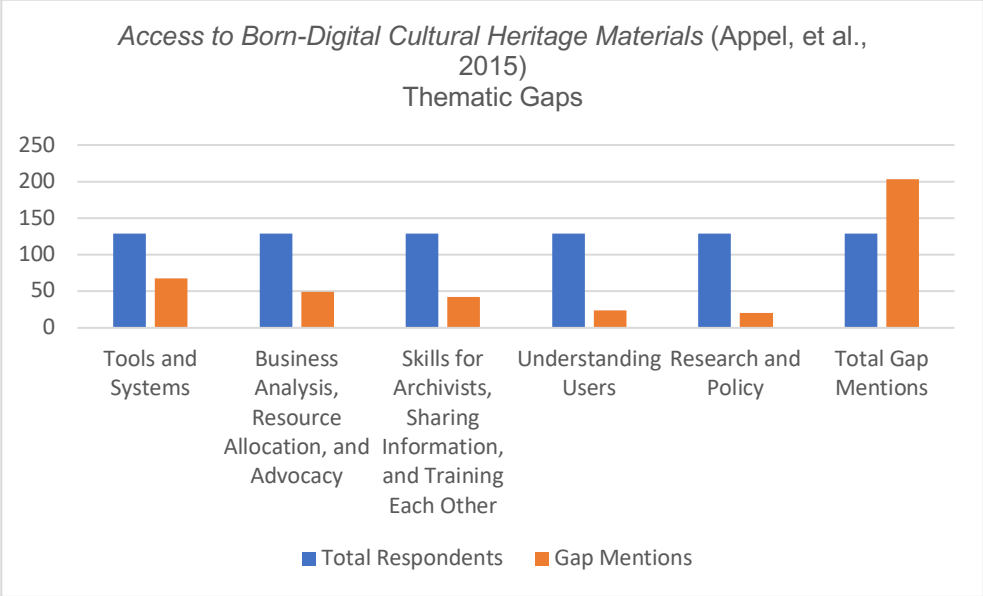
As the survey “aimed to identify gaps and challenges in existing access methods and identify plans for how cultural heritage organizations hoped to improve access practices in the future” (Appel et al., 2017, para. 1), the authors identified five gaps. Figure 2 illustrates how the ‘gap mentions’ are distributed among the gap themes:

- “Tools and Systems (68 mentions)
- Business Analysis, Resource Allocation, and Advocacy (49 mentions)
- Skills for Archivists, Sharing Information, and Training Each Other (42 mentions)
- Understanding Users (24 mentions)

- Gaps in Research and Policy (20 mentions)" (Appel et al., 2015b, pp. 14-16).

Figure 2

Access to Born-Digital Cultural Heritage Materials Thematic Gaps



For this analysis, focused on user experience, the author will concentrate on the Gaps in Understanding Users, although all the gaps ultimately affect the user experience. It is notable that according to the number of 'gap mentions' from 129 respondents, Understanding Users only receives 24 mentions. The most critical gap collectively recognized at the time of this survey was the need to address Tools and Systems. Respondents identified the need to develop adequate tools and systems to manage born-digital materials, primarily including "the need for tools to generate automated metadata and support MPLP (More Product, Less Process) processing with large born-digital collections" (Appel et al., 2015b, p. 14). Tools and Systems concerns prioritize over gaps in Research and Policy, which Goldman (2011) raised:

Most institutions cannot even estimate how much of them [born-digital materials] are present in their collections, have given no thought to what kinds of records they acquire, and have not developed policies addressing how to manage and preserve them over time. Born-

digital materials cannot be managed using existing policies for analog materials, nor can they be neglected for very long. (p. 13)

The gap with the most mentions from 16 respondents identifies the "Need for user research to uncover the access needs, motivations, and information-seeking behavior of users of born-digital materials" (Appel et al., 2015b, p. 15). Six other noted gaps include the need for collaborations among users to develop tools, providing born-digital material descriptions online, and creating access policies, methods, and strategies for communicating with donors (Appel et al., 2015b, p. 15).

Along with the initial findings, the survey also documented the many 'plans' that respondents mentioned for implementation, such as the three 'top' mentions, Access in Reading Room, Remote, and Online, Metadata for Access and Processing, and Creation of Copies and Images (Appel et al., 2015b, p. 16). Appel et al. then designed the second part of their collaborative work on born-digital access, which involved developing a 'Hackfest Team' featured at the SAA Archives 2015 Annual Meeting. Their session, Born-digital access hackfest: Collaborative solutions-building for current challenges, brought participants together to brainstorm access solutions focused on four topics: "Understanding Users, Advocacy, Agile Methods, and an Archivist Training Bootcamp" (Appel et al., 2015b, pp. 17-18), and "intended to inspire hacker teams to design achievable best practice models for access" (Appel et al., 2015a, para. 1).

Although up until the point before Appel et al. began to address born-digital access library and archives scholarship seriously, meaningful reports generated momentum on the subject. Appel et al. (2015b) confidently noted that:

> No established best practices for providing research access to born-digital materials that scale to match the volume of born-digital material and meet archival standards surrounding authenticity of records, descriptive metadata, and the protection of donor privacy and intellectual property ... no empirical data to map the existing landscape of born-digital access efforts. (p. 1)

Until now.

Canadian Centre for Architecture (CCA) Access to Born-Digital Archives User Survey (2017)

"We're just now getting to that 'Later.'" – Tessa Walsh, 2020

In 2011, with Karen Smith-Yoshimura & Cyndi Shein as primary authors, OCLC Research published a three-part report, *Social Metadata for Libraries, Archives and Museums.* It explored the emerging practices of "social metadata – content contributed by users – is evolving as a way to both augment and recontextualize the content and metadata created by LAMs" (Smith-Yoshimura & Shein, 2011, p. 9). Throughout this decade, social metadata has also significantly contributed to how LAM professionals rethink their scholarship contributions. "Institutional blogs are the most popular of web-based communication methods special collections use to promote or raise awareness of their institutions' activities and collections ... LAMs often give free rein to creative staff members who use blogs in a variety of ways" (Smith-Yoshimura & Shein, 2011, pp. 60-61).

Tessa Walsh, former digital archivist at the Canadian Centre for Architecture (CCA), is now a software developer at Artefactual. Walsh took advantage of the CCA blogging platform to share independent research on born-digital archives access "to better understand the needs and desires of the CCA's users" (Walsh, 2017, para 1.). Walsh's curiosity in how users accessed the

CCA archives reflected the similar questions brought up by Appel, Clemens, Hagenmaier, and Meyerson that sparked their access research. Walsh introduces the attention to this gap in research by noting the finding of Julia Kim's early 2016 blog entry, Researcher interactions with born-digital: out of the frying pan and into the reading room, posted on the blog of the SAA Electronic Records Section, *bloggERS*, which was ninth in a series about access to born-digital materials. Kim's research inspired Walsh to dive into this research primarily because: "Unless other institutions simply are not publishing their results, it seems that institutions have not yet done much research gathering about the expectations and needs of users of born-digital archives" (Walsh, 2017, para. 3).

Eight responses to the survey included researchers familiar with born-digital archival materials in the CCA Study Room, scholars on digital architecture with archival research experience, and internal staff who used the archives for research. Walsh (2017) understood that "the sample size and selection preclude taking too much stock in any universal or generalizable conclusions" (para. 4). However, Walsh identifies areas where she could categorize her research into User Skills and Intentions, Description and Discoverability, Access and Use, and Local vs. Remote Access. Walsh also provides an analysis hybrid including summaries of findings, detailed analysis, respondent free-text responses, and overall conclusions with next step possibilities, not just for CCA, but for considering user studies focused on born-digital access within LAMs.

One of the most critical archival issues today is whether or not to separate the arrangement and description of digital files and physical files within a collection. The current trend is to keep the arrangement intact of both digital files and physical files described together. However, respondents in the Description and Discoverability category in Walsh's query

highlights: “Very real compromises with either solution, and a legitimate desire for multiple arrangements/ways of looking at the archive not currently supported by archival technologies” (Walsh, 2017, Description and Discoverability section). Developing software in the form of an interface “to provide detailed item-level records for each individual file” (Walsh, 2017, Description and Discoverability section), which would satisfy researchers’ unanimous needs expressed in the survey in which they all “seem to value all of the metadata for a file that CCA is able to provide” (Walsh, 2017, Metadata section). Walsh was no stranger to the task, as she ultimately transformed how future staff members and researchers accessed information – through the digital archives access interface, SCOPE, in partnership with Artefactual.

Regarding access and use, the majority of respondents emphasized that they were more comfortable: “Working with original digital files from the archives on current software and machines, closely following by working with original files within legacy software environment in emulators and/or virtual machines” (Walsh, 2017, Access and Use section). Respondents offered suggestions to provide guides for users, both researchers and staff, to determine how best to work with archival materials in various formats, and “varying degrees of technical support” (Walsh, 2017, Access and Use section). Walsh designs questions regarding local vs. remote access in which respondents are generally comfortable having access to materials within the CCA Study Room with locked down stations. But “a balanced, reasonable solution to long-distance access might be providing VPN connections to CCA’s dedicated workstations following user registration with Reference” (Walsh, 2017, Local vs. Remote Access section).

Walsh understands that this survey concluded data from a small sample of relatively ‘expert’ researchers and staff who are quite familiar with working with research materials derived from digital archives. She finds a desire from respondents to experiment with research

through emulation software, find materials according to item-level metadata, and have multiple search points that enable them to search for materials depending on their preferred needs. These discoveries might shift depending on their query. Perhaps the most refreshing aspect of the survey is reading the free-form text comments that Walsh shares. The comments share a depth of qualitative data that warrants value in conducting user studies of this nature. Familiar researchers or staff can allow their professional reflections voiced personally, such as regarding preferences of describing digital files along with analog files together or separately within a collection:

"I don't have a strong opinion but feel that ultimately these resources will be increasingly accessible and therefore integrated into the more general project records ..."

And to having levels of technical support available in the CCA Study Room:

"It's the only hope." (Walsh, 2017)

Walsh concludes that more standardized exit interviews can "help us identify trends in the resulting data ... [and] designing solutions that work for access to digital archives will require us first to understand our researchers and their use cases ... let's get on it!" (Walsh, 2017, Conclusions, Caveats, Next Steps section). Most importantly, Walsh (2017), in her final thoughts, suggests "a unified effort to collect use cases across different repositories" (Conclusions, Caveats, Next Steps section). And now is the time to study users more aggressively when, as Walsh remarks as an interviewee: "The field as a whole has tended to put more effort into preservation instead of access, which makes sense ... We're just now getting to that 'Later.'"

Researcher Access to Born-Digital Collections: An Exploratory Study (2018)

"The barriers still remain." – Julia Kim, 2020

Appel et al. (2015) and Walsh's (2017) studies focused on a large pool of practitioners and a concentrated group of expert users focused within an institution. Julia Kim's study, Researcher access to born-digital collections: An exploratory study (2018), shares her work during a National Digital Stewardship Residency (NDSR) at New York University's Fales Library and Special Collections in 2014-2015. Kim's residency project, "investigating and implementing workflows that encompass the entirety of the born-digital process, from accession to access" (Manus, 2015, para. 2), required the use of digital forensics.

A collection of born-digital materials, the Jeremy Blake Papers, produced by American digital artist and painter Jeremy Blake (1971–2007), became Kim's focus, and the Exit Art Archive, both of which were processed starting in 2014. The Papers "include files copied on-site at the donor's house from Blake's MacBook Pro, an external hard drive, and a flash drive. NYU also acquired several hundred optical disks, three additional hard drives, dozens of zip disks and digital linear tapes" (Manus, 2015, para. 5). The Exit Art Archive is a collection acquired from the closed "iconic and nonprofit Manhattan art space Exit Art ... where it was known for its innovative curation of interdisciplinary, multimedia artworks" (Kim, 2018, p. 2). According to Kim (2018), the voluminous analog collection included "the institution's 2TB RAID drive, a data-storage device (noted in series XII: Data Storage of the finding aid) ... this collection is immense in size, content, and file types (e.g., email, images, word processing spreadsheets) including obsolete Microsoft Word for DOS word-processing files from the 1980s" (p. 2).

Kim's workflow projects unfolded. The purpose lay mainly with providing access to this type of born-digital artwork and its documentation for the end-user, especially since these types of material formats were mostly obsolete and needed migration into more current systems or experienced through emulations. Kim moved into the next phase of designing and conducting a

small usability study with five experienced Fales researchers “using different types of emulated, migrated, and ‘as-is’ access on both contemporary and obsolete computers” on both the Jeremy Blake Papers and the Exit Art Archive (Kim, 2018, p. 1). Kim (2018) echoed Appel et al. by noting the “scant documentation on the end-user’s experience of access” (p. 1), and her study set out to experience the end-user’s approach to accessing the collections and how migration and emulation affect their purpose for conducting their research.

As Walsh acknowledged that Kim’s study was a foundation of her user survey, Walsh approached her survey differently. She did not provide specific ‘tests’ to measure the success of accessing born-digital materials. Kim (2018) initially:

> Worked closely with the digital archivist and experimented with many iterations of emulation installations to support viewing a representative sample of Blake’s Adobe Photoshop files. When the selected researchers handled the Jeremy Blake Papers, they primarily focused on evaluation of these emulations. (p. 3)

Within the ‘experimentation’ study with the researchers, Kim (2018) identified “an underlying question throughout the project was whether researchers appreciated (in the full sense of the word) the emulation” (p. 3). The study took place at the NYU Digital Forensics Lab with researchers who mostly had “multiple disciplinary competencies” (Kim, 2018, p. 4) and understood the nuances of research in subjects such as the digital humanities and platform studies.

Researchers allowed Kim (2018) to record their experiences in audio and video as well as encouraged them “to use Think Out Loud Protocol for verbalizing their thought and handling of material” (p. 5). "Thinking aloud may be the single most valuable usability engineering” (Nielsen, 2012, para.1). The born-digital files portion of the study concentrated on the “Jeremy

Blake Papers, which were accessible in emulation, on period computers, and on contemporary computers with Adobe Photoshop software and the Forensic Toolkit suite" (Kim, 2018, p. 5). The Toolkit "is a court-accepted digital investigations platform that is built for speed, analytics and enterprise-class scalability" (FTK, 2020).

Kim (2018) provided the researchers with initial interview questions that prompted various queries: How they were accessing the materials along with encouraging the researchers to share their "Expectations for a born-digital finding aid, their expectations for file types and quality, and their ability to understand and make sense of the collection without the benefit of an arrangement from a trained archivist" (p. 6).

The most efficient method of Kim's assessment of the researchers' experiences, providing an unstructured environment with prompts, allows Kim to single out the participant comments. Concerning access, the researchers made assessments concerning possible multiple arrangements of the digital files in which researchers could have access to conduct their research using tools such as the Forensics Toolkit and BitCuratorAccess, "a project that created web-based tools that allow accessing disk images" (Kim, 2018, p. 8), and as Kim (2018) notes "could in fact be a new era of foundational 'respect des fonds' ... minimally processed disk images are increasingly possible alternatives to arrangement" (p. 8). Researchers implied that technical expertise for various programs to access emulated born-digital materials or legacy media is understood just as they need to become savvy with the changing technologies. "Technical competency of some kind was no different from any other type of 'content' competency in a field" (Kim, 2018, p. 9).

Most significantly, researchers "enjoyed the novelty and sensory experience of navigating the emulation. But many repeatedly expressed the common desire for 'greater ease of

manipulation and faster speed'" (Kim, 2018, p. 9). The question of the authenticity of the emulations prompted Kim (2018) to consider that: "Researchers and archivists may diverge on authenticity and its overall value in providing access to complex born-digital collections ... There is an argument to be made for 'good enough' strategies to allow for greater access to collections" (p. 10). And the excitement and enthusiasm a researcher expressed for having the opportunity to access born-digital collections and experiment with emulation concluded to Kim (2018) "both a validation and a call for further collaboration with other researchers to study born-digital collections" (p. 10).

The complexity of Kim's study mirrors the complexity of studying born-digital collections access and researcher experiences. These collections are not as available, and "only a handful of institutions provide emulated access to such collections" (Kim, 2018, p. 11). With the support of advancing emulation and software preservation processes and tools such as through the most recent efforts with the Yale University Library and the Software Preservation Network (SPN)'s EaaSI –Emulation as a Service Infrastructure software preservation infrastructure, more born-digital materials such as the Jeremy Blake Papers and in the Exit Art Archive will be easily accessible.

Similar to Appel et al. and Walsh, Kim (2018) concludes that in preparing born-digital materials for access and understanding user experiences, "More research should be done. Even with field-wide improvements, born-digital access has high barriers" (p. 11). These include the limited resources for many smaller institutions to sustain born-digital collections solutions and incorporate user studies into workflows. Kim's extraordinary contribution to user studies regarding born-digital access, especially investigating access through emulation, rings loud and clear. She declares:

> Let us then collaborate with researchers in more complex born-digital access studies as we consider new materials and methods, expansive notions of context and 'content,' and a fresh sense of how we can make the most of our resources and resourcefulness. (p. 11)

Collecting User Experiences, Needs, and Desires for Accessing Born-Digital Archival Collections (2020)

"It revealed to us how little we know who our users are." – Jess Farrell, 2020

Riding off the coattails of DLF-BDAWG's now award-winning contribution to LAMs, *Levels of Born-Digital Access*, BDAWG's Access Practices and Outreach subgroup published its first user study. The subgroup embarked on this investigation because:

> One challenge that has arisen over multiple discussions about the accessibility of born-digital archives is that LIS [Library Information Science] professionals do not often know how users consider use of born-digital materials, whether they experience roadblocks to access, and what they would ideally want from discovery and access. (Clemens et al., 2020, p. 1)

The subgroup also understands and is familiar with challenges in obtaining the necessary resources – financial, organizational, staffing, and technology. It states that "providing a clear set of needs and requirements for effective access and discovery systems ... is the first step for securing the resources required to serve our users' needs" (Clemens et al., 2020, p. 2). Knowing that the library and information science (LIS) and archive fields have produced many systems to provide access and "previous work has been done in this area, but only a small amount of materials has been publicly released" (Clemens et al., 2020, p. 2).

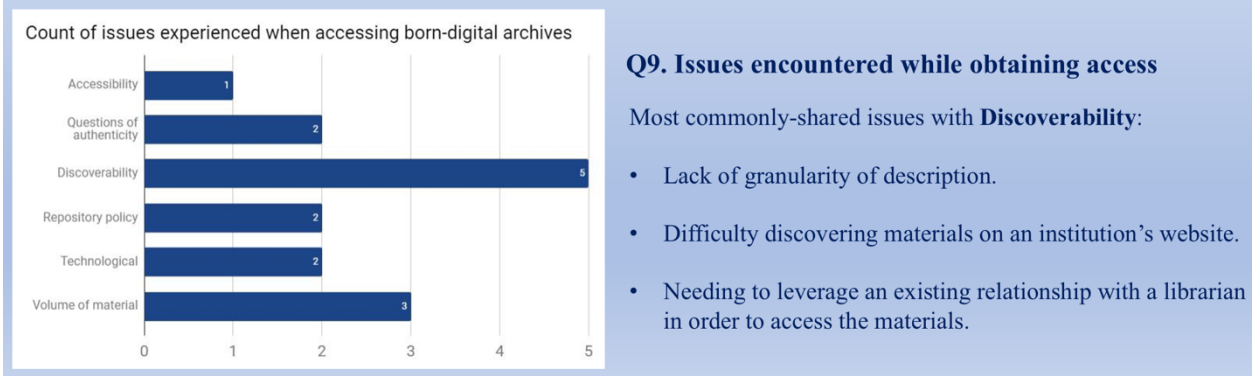
As they mention Walsh and Kim's works and the work at Emory University, the group set out to provide a set of 15 questions distributed among "a number of communities to contact

for survey participation" (Clemens et al., 2020, p. 2). Returned were thirty-one surveys. However, some were "removed due to incompleteness and in at least one case, a lack of respondent clarity regarding born-digital versus digitized archival material" (Clemens et al., 2020, p. 2). They retained the raw data set for research purposes. The survey questions ranged from: Inquiring about the respondents' experiences using and accessing born-digital materials, their experience with support for discovery and access to born-digital materials, their interest in performing data analysis on born-digital collections, and what their ideal experiences would be with working with born-digital collections. Regarding access, three of the questions focus on crucial areas involving access issues, materials accessed and the experience, and ideal user experiences.

Although the previous question before 'Q9. Issues encountered while obtaining access,' indicated that the respondents could most easily access the born-digital materials, they describe, using free text, various issues, whether they had the ease of access or not, that "fell into the following categories: accessibility, questions of authenticity, discoverability, repository policy, technological, and volume of material" (Clemens et al., 2020, p. 6). Clemens et al. (2020) state: "Of the reported issues, the most commonly shared were issues of discoverability (5 responses), which included a lack of granularity of description, difficulty discovering materials on an institution's website, and needing to leverage an existing relationship with a librarian in order to access the materials" (p. 7), as measured in Figure 3.

Figure 3

DLF-BDAWG Collecting User Experiences Question Example on Discoverability



Clemens, A., Anderson, S., Bunde, J., Butler, D., Chassanoff, A., Farrell, J., Farrell, M., Helms, A., Walker, P., & Weintraub, J. (2020, March). Collecting user experiences, needs, and desires for accessing born-digital archival collections: Survey analysis. *Open Science Framework (OSF)*. http://bit.ly/38NlmrG

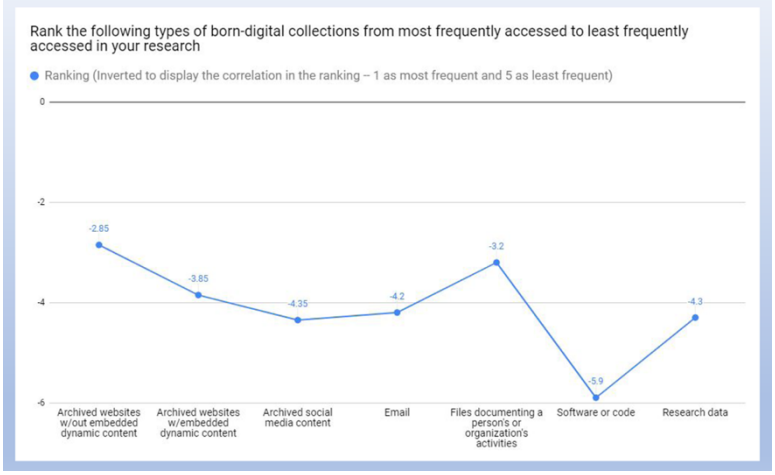
Responses to the volume of material were assumed to be related to born-digital materials not adequately described on institutional websites, catalog records, or in finding aids that "may not provide sufficiently robust access points to users" (Clemens et al., 2020, p. 7). The responses to technical issues mention "file obsolescence and poor documentation of the institution's Application Programming Interface (API) for accessing the data" (Clemens et al., 2020, p. 7). One response, "Database structure difficult for screen reader software'" (Clemens et al., 2020, p. 7), brings up critical needs regarding accessibility. Aligned with Arroyo-Ramírez et al. (2020) Level of Access, this mention focuses "on what measures (physical space, software, tools, policy, etc.) are in place to provide access for researchers with disabilities" (p. 7). Clemens et al. (2020) further question: "What are the limits of providing equitable access to digital objects that were not created with accessibility in mind, and are also potentially unsupported by current accessibility technology?" (p. 7). Although Clemens et al. (2020) realize that many of the issues are out of many LIS and archive practitioners' control, the survey question revealed: "Cascading

dependencies between the descriptive systems in use, the technological platforms to store and serve materials, and the software dependencies of the born-digital materials themselves" (p. 7).

'Q13. Please Briefly describe what analysis you performed and how successful your experience was' provides information that respondents shared regarding what types of born-digital materials accessed and the ease of their access. Leading materials were "web archived websites with dynamic content, such as a blog post ... [and] digital files documenting a person's or organization's activities" (Clemens et al., 2020, p. 11) (see Figure 4). As more born-digital materials become discoverable and access tools are more accessible to users from various access points, such as virtual reading rooms and open-source web software, more resources become available to collecting institutions to manage born-digital materials within the complete stages from processing to access. The user communities from different types of disciplines, and reasons for access, and the types of materials accessed will continue to evolve.

Figure 4

Q13. Data Visualization of Rankings



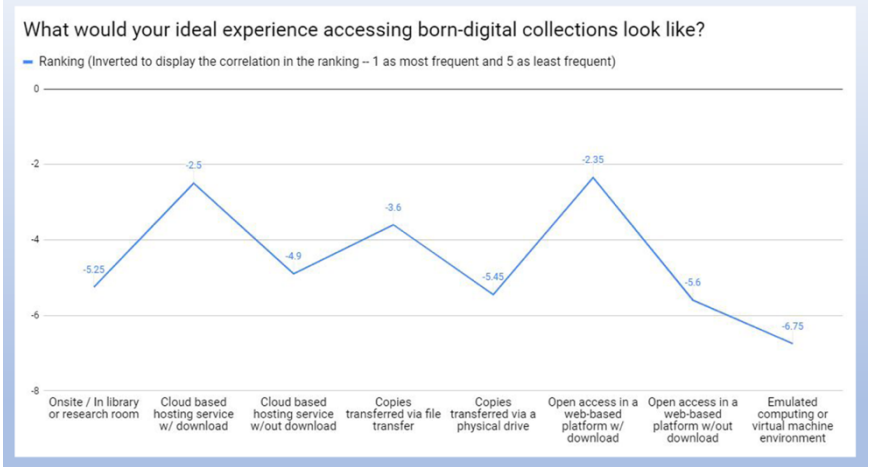
Clemens, A., Anderson, S., Bunde, J., Butler, D., Chassanoff, A., Farrell, J., Farrell, M., Helms, A., Walker, P., & Weintraub, J. (2020, March). Collecting user experiences, needs, and

desires for accessing born-digital archival collections: Survey analysis. *Open Science Framework (OSF)*. http://bit.ly/38NlmrG

'Q15. What would be your ideal experience accessing born-digital collections?' revealed the replies: "'Open access in an institutional repository with the option to download' ... [and] 'remotely through a cloud based hosting service (i.e., Dropbox/Google Drive) with the option to download'" (Clemens et al., 2020, p. 12). Especially with the ability to download. The "lowest ranking was 'Emulated computing or virtual machine environment'" (Clemens et al., 2020, p. 12). This ranking could explain a variety of scenarios: Users are not yet familiar with accessing materials within emulated or virtual machine environments; Materials accessed within these environments (such as the Jeremy Blake Papers or the Salman Rushdie Digital Archive) are not yet processed and discoverable; or users provided with a choice between accessing materials through emulation or new software is the preferred method of access (see Figure 5).

Figure 5

Q15. Data Visualization of Rankings



Clemens, A., Anderson, S., Bunde, J., Butler, D., Chassanoff, A., Farrell, J., Farrell, M., Helms, A., Walker, P., & Weintraub, J. (2020, March). Collecting user experiences, needs, and

desires for accessing born-digital archival collections: Survey analysis. *Open Science Framework (OSF)*. http://bit.ly/38NlmrG

Overall, the survey indicated to the BDAWG subgroup that further research on users of born-digital materials are needed to continue to improve access even though the respondent was smaller than expected. There were areas that the survey responses revealed to encourage future study and warrant inquiry:

- "User confusion distinguishing between digitized and born-digital archival material.
- Further research into and documentation of existing access practices particularly at a variety of institution types outside of typical large research institutions.
- Focusing on extant access practices ... identifying and recruiting survey respondents ... via improved user recruitment ... many more people using born-digital archives that we don't know how to reach.
- Target library and archives staff who provide access and ask how they assist users in a future research project.
- Collaborating with other groups and projects as they arise ... encouraged by an apparently increasing number of conversations regarding archival discovery" (Clemens et al., 2020, p. 12-14).

With BDAWG's survey contribution to the field, it is apparent that not only are more user studies regarding born-digital collections access warranted, but that collaborations are the key ingredient to advancing this activity by sharing resources. In the words of co-author Jess Farrell and one of the interviewees featured in this paper, "We need to help each other with this guidance. We can't just meet and talk about it every month. We need something out there that can be shared widely."

Discussion

Findings

"I'm making a lot of assumptions about what users want and I think we do that a lot as librarians. We don't actually know until we study it and observe it." – Kate Dundon, 2020

These four user studies are the founding models for analyzing the user experience of born-digital collections access, authored by a new generation of LAM professionals who have set the trend. Their studies, motivated by curiosity and recognizing gaps in the scholarship record, provide valuable information for understanding and improving the user experience. Most importantly, the surveys give clues to understanding user studies' necessity, their implementation practices, and how evaluative tools can be effectively designed and distributed. Similar critical findings from the analysis of the surveys and the majority of the open-ended interviews reveal five themes:

1. Access cannot take place until institutions address digital preservation and establish and execute born-digital collections processing workflows.

The experienced digital steward, Julia Kim, Digital Projects Coordinator, National Library for the Blind and Print Disabled, Library of Congress, heralds the conversation that exemplifies this theme. A significant advocate for digital stewardship, Kim recognizes that as practitioners are just now figuring out how to process born-digital materials successfully, user studies focused on access are still in the nascent stages. Access requires institutions to address digital preservation and processing workflows first to ensure that optimal access is possible. Kim remarks:

> The field moves quickly, but also slowly. These issues are still field-wide. How do we understand our users and make sure, as we're processing and making born-digital

> collections available, that this is maybe what they need, what they want, all the while making sure of the long-term, preservation aspect?

Brian Dietz, Digital Program Librarian for Special Collections, North Carolina State University Libraries, and the newly appointed BitCurator Consortium (BCC) President, agrees on the same line regarding processing workflows:

> I usually avoid "hierarchy of needs" reasoning, but it, sort of, applies here. I think we've seen an increased focus on access because more and more of us have gotten a hand on how to secure ("process") digital material. It's, like, that has to come first. As more and more of us get a hand on how to provide access, we'll see more and more people talking about usability assessments.

Kate Dundon, Supervisory Archivist, University of California, Santa Cruz (UCSC) Library sees born-digital collections access as part of the infrastructure in building the collections:

> The whole concept has changed and has forced me to rethink on how much we approach archival collections and how we approach access. [I] process a collection, whatever processing means for born-digital, and make it accessible to the public. [The] driving factor is access. There really is no point in doing the labor of processing if you're not then making that work available to the public.

And, although access cannot indeed happen without attending to digital preservation and processing workflows, studying access seems to exemplify what Alison Clemens, Head of Processing, Manuscripts & Archives, Yale University, calls the "'chicken and egg' problem." How do we know that the systems to access efficient if we don't understand what the user experience is? Dundon replies that the field needs: "More demonstratable use of the collections

before we invest more of our time in studying the use of them. If people aren't using this content, I don't want us to invest our resources in continuing to build systems around it." Kim also understands these 'chicken and egg' problems:

> The idea that we need to do more of these prolonged forays into understanding patrons would be useful, but we can only move along in 'lock step' with the other things that have to happen. [This] brings up critical aspects of the processing workflow. You might not know some of those issues unless you try to 'bring it up' [access materials].

Most of all, Dundon concludes that: "The essential element is giving yourself the space and time to build it, the infrastructure for processing and access. That in itself is a hurdle for a lot of archivists to get this work going."

2. Identifying users is an ongoing challenge.

User studies assessed practitioner pools creating and accessing born-digital collections, expert researchers, and 'general' users. Questioning *who* are actively searching for collections comprised of born-digital materials and accessing them will continue to be a challenge in producing survey results. Tessa Walsh, Software Developer, Artefactual Systems, and several of the other interviewees understand this problem. Walsh remarks:

> Part of it [limited user studies] is that we don't know who they [users] really are. How do you find users for a thing that's relatively new and not on most people's radar in a field where, by and large, we protect user privacy and don't keep records of who used what? There's a lot of limitations.

Interviewees agreed about identifying researchers and various survey methods and outreach strategies conducted together will most likely reach more users. Clemens remarks:

> [I want to] talk with our users, meet them, and talk about their needs ... media historians, digital photographers, folks who are interested in media as artifact. At Yale, our access methods are so evolving, [regarding a methodology for a user study] I don't want to create tasks for users, I want to hear about what it is [that] they are trying to accomplish.

Wendy Hagenmaier, Digital Collections Archivist, Georgia Tech Library, suggests that actively targeting users might be a key to a better understanding of who users are and why they are accessing born-digital collections:

> [During] the pandemic, the pressure that's being put on remote access, we can leverage that to support our work. Emphasis on anti-racist work, or how we can see through that lens, [we can use] very small-scale user interviews informing that work [to determine] who we're not reaching or how we're not meeting their needs. We can't meet all their needs, but we can at least learn what they are.

However, limitations exist to understanding users for two reasons: lack of researcher interest and professionals actively conducting user studies. Kim surmises:

> There's just not that many researchers who are not interested in this type of material or the type of material that we think they are most interested in investigating, as emulations for example. There aren't that many [born-digital collections] available still, so they [surveys] are trickling. It will take more concerted work to understand and keep doing research in this area but, when you look at digital archivists and these jobs – usability studies? Not there.

One concept that affords investigation is to have field practitioners, mainly reference archivists or digital archivists, a part of conducting face-to-face interviews or supplying online exit interviews with researchers specifically accessing born-digital collections. Although

challenging to use human resources to conduct interviews regularly, encouraging researchers to become a part of the studies by sharing their experiences on more informal levels may capture more in-depth information about who users are. Dundon recalls her informal interviews with researchers accessing born-digital materials on a laptop in the UCSC Special Collections Reading Room:

> I thought if I can get one of these early born-digital researchers to give me feedback on the process then that is one passive way to get free information from them. Both of these people I worked with were very happy [about giving feedback]. They want to talk about their work. They like talking with an archivist about their research topic so I try to make them feel good about this work. My hope is that we'll start seeing authors publish content citing born-digital and it can become more of a regular part of the scholarly record. I try to encourage their interest it, and one researcher found some really interesting stuff in her research that she wasn't expecting to find.

Like Walsh, Dundon agrees that now is the time to design and implement user studies to understand better what users need to access born-digital collections successfully. She concludes: "We're going to continue to get more and more 'born-digital' as the years go by. We should invest a little bit of time now and take a step back and look at how people do perceive this kind of content when they're presented with it."

3. Barriers to access continue to exist.

Collectively, the studies all convey that 'discoverability' is a crucial ingredient that drives access, and various factors are barriers to access that can inhibit a user's overall experience. The most significant obstacles mentioned by interviewees range from the environment to conduct successful user studies to actual barriers that users experience when accessing born-digital

materials. Kim says it best when considering the challenge of actually conducting studies within work environments:

> The notion of doing usability studies within our fields, that it's not really done is part of the problem. Having digital archivists doing usability studies is just not mapped out or it's called something different like 'measuring success' in the tradition of reference statistics. But with software management protocols and usability studies it's not...who would do it? We [survey authors] did it on top of our existing jobs because we were curious, but it wouldn't be part of that job.

Tools for access exemplify barriers addressed through user studies. Dundon describes her work evaluating tools for access along with UCSC User Experience and Web Services Librarian, Jess Waggoner:

> It was a real valuable experience for me to have Jess's careful attention on every step of the workflow. Access [regarding the reading room laptop or finding aids], to us, seems so seamless because we're in it. But there are so many steps a user has to go through, to just get the 'stuff.' Every step can be a barrier. To have Jess articulate that and then have the subjects in the study and witness them go through that was very revealing.

Lack of granularity in descriptive metadata and finding aid materials can be a consistent barrier to access. Walsh identifies how user studies can disclose barriers via metadata: "In relation to not necessarily technology but the language that we use in archival description has a big impact on discoverability. G [galleries] LAM folks, we love our anacronyms and our jargon, but it doesn't always translate to people from other disciplines who then come in as the users." Navigation on search interfaces also constitutes many barriers to users, especially for inexperienced researchers. Cate Peebles, Museum Archivist, Yale Center for British Art recalls a

small usability study incorporating tasks and research questions to understanding how users searched for a particular set of materials:

> We found that when you're so close to a system, in a certain way you're too close to it to see how people actually might use it. Things that we thought were maybe obvious about where to locate parts of collections, like a file in a collection were not obvious to someone who isn't an experienced researcher. Even things such as how do I physically access the collection for materials, information, we found, wasn't front and center enough. People having to scroll ... [saying], "Where do I actually go to get this?"

Privacy concerns conducting user studies is a significant barrier to obtaining information about user experiences with any collection. Farrell remarks: "Our privacy policies with patron data is the biggest barrier to get across. I think that we can learn more from our librarian colleagues about that because they are adept at protecting patron data while still using the data for the statistics they need." Hagenmaier agrees that privacy in conducting user studies is critical. Also, users should understand that their ease of access to materials using more robust and sophisticated retrieval systems is vital to practitioners. Hagenmaier:

> We have different goals as a library and as a cultural heritage institution and we need to make explicit what it means for us to provide access and how our access is valuable because it's not going to work as well as Google. But hopefully it's going to be better because we're honoring our principles and our ethics. We make that more explicit to the user about what their getting out of their access experience or how we're respecting them through it.

Another critical barrier to access is practitioner training to conduct user studies successfully. The survey authors did not specialize in usability studies and UX testing, such as

Waggoner, who learned these skills in her Master's in Education, focusing on instructional technologies. Hagenmaier suggests advancements in incorporating user experience testing education into professional skills development opportunities and in LAM undergraduate and graduate degrees. Says Hagenmaier: "More training to be able to do research and research methods research. The concept of doing user studies is more talked about at conferences and locally. The awareness is increasing, but I don't know if the skills are. In curricula, [incorporating] research methods and applied research methods studies are a way to lower that barrier."

Finally, the survey tools can be barriers to understanding user access. Asking the 'right' questions tailored to the institution's specific queries and needs are the most optimal approach. According to Dietz, "I think our questions are: Can we provide access to the materials researchers have asked for? What sort of pain points are we, or they, experiencing? And how do we address those and correct for them the next time, whether that means a new tool or a new workflow or approach?"

4. Implementing user studies needs various levels of support.

Institutional 'buy-in' from the administrative level to the practitioner and user levels is necessary to incorporate user studies into born-digital access practices and workflows successfully. And institutional and practitioner collaborations within LAMs and other types of aligned organizations can provide a blanket of support. It allows for a cultural shift in user studies advocacy to occur as born-digital collections increase in volume, and more users attempt to access them. And, to afford buy-in takes time. Kim remarks as to what is needed:

> Top-level buy-in. For all the steps that need to proceed access for that to be meaningful. Many institutions grapple and many stewards and digital archivists grapple with trying to

> make sure that this is understood, what they need, the buy-in that they need be able to do their job. It's not just that 'one step thing,' it's that whole chain of events and processes that may take many years for that patron to come into the room and say, "Can I have this artist's work and take a look at it within this type of context or my research context?"

Buy-in also means funding. As Dundon says, "It can be a hurdle to try to get administration on board that they never used to have to fund. It's a slow evolution." How to approach funding for the entire digital preservation and access 'chain events,' including the study of born-digital access and user studies, takes effort by the practitioners to strategically advocate for what it takes to provide access. Farrell describes an experience advocating for funding:

> I wanted to talk about born-digital access, not born-digital preservation, and not born-digital processing because those are the things that the archivist cares about and has to care about and should know all about, but the person really pulling the purse strings doesn't need to know so much about that. They just need to know that all that has to happen in order for access to happen, so they need to fund it ... make a space to specifically talk about born-digital access.

Support from administration also depends on how to describe the role of the new generations of LAM professionals who are working with born-digital collections. Hagenmaier, whose grassroots efforts helped spur PAR&D and user studies into the archival profession, thinks that her work in user studies needs highlighting within her job description. "Putting 'usability studies' or 'user research' in people's job description [would] raise awareness for administrators. These are things that people should be doing and needs to be supported" (Hagenmaier). The question of who conducts user studies is also a part of structuring LAM practitioners' future job performance roles. According to Walsh:

> It's not just the digital archivists who have to do everything from knowing what collections are available and how to interact with them but it's moving some of that to the responsibility of reference where it should have been from the beginning and enabling them to do the work for these newer formats. In terms of the [user studies] methodology, I would try to incorporate it into the reference workflow as much as possible.

Waggoner's role at the UCSC Library and the User Experience Department at NC State University Libraries are examples of how support for user studies on born-digital collections access can become implemented within LAMs. Waggoner, the co-author of a recent essay in *The Academic Librarian in the Digital Age: Essays on Changing Roles and Responsibilities* (2020), edited by Tom Diamond, states:

> [I've held] the more traditional position as Web Services Librarian [as] handholding with creating the content. Content creation has grown among library staff and librarians coupled with evolution of technologies to make it easier to create 'nice-looking' content. Our role is able to transition from helping people with actual code to get content onto the web to focus more on, "You've got content, how do we make this as usable as possible?" It has kind of organically transitioned a bit too.

Levels of support for the user come in the form of providing optimal access to born-digital collections and participating in exit interviews and user studies. Also, taking advantage of human resources in academic institutions, such as undergraduate and graduate students in LAMs to support conducting user studies, provides a fundamental support level. Both Waggoner and Dietz encourage budgeting for incentives for participation in user studies. In Waggoner's experience with providing incentives and working with students:

> Do incentivize moderated usability testing, 3-12 participants per study, with $10-25 gift cards. [I had] no problems with administrators to pay for those incentives or allocate the funding for my students each quarter so I felt really supported in that way. Our administrators see this as a venue for undergraduate students to learn applicable skills. We can create positions that allow students to practice what they're learning in their courses or learn skills for what they can bring into the workplace environment, and I've benefitted from that.

Perhaps the most exciting level of support is through community facilitation and cross-collaborations. Here is where the potential for creating a culture for championing born-digital access is currently most fruitful and encouraging for smaller LAMs to take part along with their larger institutional cohorts. As the Educopia Institute's Community Facilitator, Farrell has the pulse on how to align projects and practices within consortium-modeled and grant and foundation-funded programs that bring LAMs and practitioners together to produce products that will transform practices. Farrell also encourages "hack-a-thon-type spaces when you are working on emerging fields like this [born-digital access]." The work with organizations such as the BitCurator Consortium and the Software Preservation Network (SPN), especially with their new project resources such as BitCuratorEdu, OSSArcFlow, Emulation-as-a-Service Infrastructure (EaaSI), and Fostering a Community of Practice (FCoP), drive and encourage participation. Many organizational and institutional working groups, such as DLF-BDAWG, also urge collaborations and partnering with software vendors. And all the interviewees champion community facilitations and cross-collaborations and understand their valuable role regarding access. Farrell concludes:

> I really do think our [Educopia's] role is to connect these institutions and allow them to make discoveries, build things, learn things together that they wouldn't be able to learn if they didn't have an outside voice to bounce that idea off of or just learn what someone else is doing at an institution. There are more and more spaces to do that than ever before but, it's still evolving. We've thought about collaboration a bit more 'transactionally' in the past. These smaller, facilitated conversations are where people can learn from each other. [Collaborations are] the key ingredient. Because collaboration is only going to become more and more required as our resources become thinner and thinner.

5. LAMs will benefit from vetted and shareable models of user studies on born-digital collections access practices and standards, survey tools and resources, and education and scholarship.

Building on collaborations is the interviewees' unanimous voice that resources to conduct user studies on born-digital collections access need to be "vetted" (Dietz) and shareable. These resources, tailored to the individual, institutional needs, can become widely accessible among institutions and practitioners. One influential model is the user studies methodologies which seasoned LAM professionals are using within their work. As the surveys illustrate here as 'grassroots' attempts to gather user data and assess the user landscape, Walsh admits: "I would have benefitted from having a statistician or someone who was more of a methodological expert. [The survey] was a very casual thing. [We need] more rigorous methodology." And Kim recognizes the challenges to produce excellent quality of both qualitative and quantitative data sets from user studies:

> If you're asking if rich, qualitative approaches really work with this [user studies on born-digital access], I think they're more geared toward it. You get the seeds of other

> really interesting research questions to follow up on in these [types] of interviews. It's [quantitative data] maturing but we've got a long way to go.

However, Walsh and Kim's user studies were the perfect foundational models for Clemens, who based her 2018 Yale Manuscripts and Archives (MSSA) project report *Use of Born-Digital Collections at Manuscripts and Archives* (updated in 2019) on their survey frameworks. It takes a concerted effort by practitioners to seek out resources and scholarship from LAM colleagues. Making them more shareable is the key to better practices. Hagenmaier believes in:

> Sharing the language and the concepts. Whatever we can do to lower the barrier to entry and advocating for things like putting it [user studies] in job descriptions. Examining the systemic issues that maybe we're baking into these [user studies]. Consideration of templates, [balancing] the tension between some sort of templated, distributive user study versus a hyper-local, in-depth interview, and the intention about what we aim to get out of both of those tactics. Just build a culture of that [user studies]. Part of that is to identify who we are *not* reaching.

And Dietz:

> I think it's important to share your work. It's really hard to know who all is doing what, and I think there's plenty of room for people to get their work not only recognized but referenced in others' future work. I'm big into the "spot a need, fill a need" kind of thinking right now. I think individually we don't need to wait for someone else to fill needs.

Waggoner agrees that sharing among institutions and practitioners is the most viable option to continue to produce valuable user studies that can shape LAM practices on born-digital access:

> I do try to share are my methodologies because those definitely are transferable, so at conferences I speak not about this is what we found, but about methodologies. UX methods, such as creating journey maps and how to create personas, these are definitely shareable. We should be talking about, "Here's how I created these personas, and here's what I found that worked, and here's some great primary data sources or secondary data sources that I used in my institution" because a lot of folks actually have secondary data sources at their disposal that they don't really think about when they're embarking on user needs assessments.

Overall, the most crucial component of sharing various means of LAM born-digital access tools, practices, and scholarship is to value adaptability, flexibility, experimentation, and collaborations that will lead to convergence. The sharing of knowledge is imperative to improving access. In Dietz's words:

> I think our approach, and one that I think is gaining traction, is to rely on one's general knowledge about archival principles and practices, and to figure out how to best apply those to born-digital material. We don't need some super sophisticated application in order to provide access to materials. And it's not that we don't not need a "perfect" tool, it's more that we should reject the idea of a "perfect" tool. I think what we should focus on is more of a triage approach. How can the tools and resources that we have ready access to be combined to support an approach to access that provides researchers exactly what they're asking for? I think the DLF's Levels of Born-Digital Access are predicated on this sort of idea. I really hope that the DLF's Levels of Born-Digital Access become a resource that practitioners find useful and help organizations with implementing approaches to support access to digital archival materials.

What about Museums?

"LAMs are mixed together just by way of that public programming, safeguarding, object-based persona but they are very different in a lot of their approaches." – Liz Galvin, 2020

Dr. Paul F. Marty, Professor in the School of Information at Florida State University, is one of the leading LAM scholars on museum informatics – merging people, information, and technology. In 2009 Marty initiated a LAM scholarship feat with his heralding of 14 papers that focused on the digital convergences in LAMs published in special issues of *Museum Management and Curatorship* (Volume 24, Issue 4), *Archival Science* (Volume 8, Issue 4), and *Library Quarterly* (Volume 80, Issue 1). Each journal built upon similar themes but from different LAM professional perspectives by:

> Exploring the shared information needs and challenges facing libraries, archives, and museums in the information age; the overlapping educational goals of library and information science, archival studies, and museum studies programs; and areas of convergence for educators and professionals working to meet user needs in libraries, archives, and museums ... driven by the idea that the increased use of and reliance on digital resources has blurred traditional distinctions between information organizations ... encouraging more research examining how libraries, archives, and museums can collaborate and combine forces to better serve their users. (Marty, 2009, p. 295)

In the context of user studies on born-digital collections access, museums, within Marty's vision and the holistic analysis of LAM digital convergence, are even more challenged in understanding users. The user surveys here focused on born-digital archival collections access mostly within libraries and archives. Museums' born-digital materials "such as digital media art, historical data on digital formats, and scientific research data" (Ray, 2013, p. 216), are not

necessarily accessible in the same manner. Therefore, user studies involving born-digital museum collections will need unique tailoring relative to ones designed for library and archive users. As Kim remarks: “Museums have a very different problem set [such as time-based media] ... there’s a little bit of overlap, but the questions are different.” Liz Galvin, Head of Learning and Digital Projects, Victoria and Albert Museum, recognizes the challenges to understand users because museums work differently regarding their gathering of information. Galvin remarks:

> Museums work mainly in the 3D ... the content is more about the research base of it [artworks] rather than transcribing of what it’s literally saying. That mentality lends itself much more to digital collections. If one thinks about how digital collections are catalogued and archived a lot of the work is actually built up on library and archive systems and I think this is why there is a gap for museums to get to that place.

User studies in museums aim at a broad range of audiences who engage with digital artworks/collections, applications, and digital engagement interpretive interfaces, either physically in the museum or online. These types characterize usability studies and UX testing. However, user studies for museums will eventually involve studying access to born-digital collections, such as artists’ archival materials preserved in museum archives, along with institutional born-digital records. Future user access to data among LAMs and collecting repositories, such as providing Linked Data (LD) and Linked-Open Data (LOD), will depend on the relational software systems that house data used by LAMs. User studies that explore how users access born-digital collections within these software systems will become part of the conversation. Farrell agrees that understanding how museums fit into the born-digital access picture regarding systems is a “tough question:”

> In these collaborative communities is where museums and archives can really work together to solve some of the same issues together because in 'domain-specific' preservation, such as how to preserve architectural records, the different domains of software have different domain format specifics. With archives, there are certain types of really unique, really important content that they zone in on and treat like the same kind of conservation level practices that museums have. That's where I see 'intersections.'

What is being archived and preserved in museums is also a new conundrum when it comes to born-digital materials and their access. It is an investigated subject regarding the preservation and access to born-digital scholarly art research materials and web archives. Duncan (2015) addresses this by saying:

> The worth of web archives is demonstrated by instances in which researchers are seeking specific ephemeral art materials and discover they have vanished from the open web, or that a large percentage of scholarly web citations lead to broken links and content that has ceased to be available online. (p. 51)

Two ongoing projects at the Victoria and Albert Museum address digital engagement with its audiences to better understand their access to their programs and collections. *Content/Data/Object* "aims to articulate ways in which museum practice and international cultural property law could adapt to accommodate and enable meaningful access to conceptual, ephemeral and immaterial digital artworks" (V&A, 2020). *Show + Tell + Share – Presenting V&A Collections to Future Audiences*:

> Prototypes ways to increase the relevance of V&A collections to future audiences through better display of – and access to – the incredible objects in our care ... Three research strands focus on the museum object; on big data; and on public engagement.

> Together they explore the current and potential future barriers to access, how to respond to the changing expectations for access to the collections on- and offline, and new approaches to overcome these barriers. (V&A, 2019)

Galvin emphasizes that in these projects and the programs that involve online learning and digital engagement, user surveys:

> Especially for the digital programs, are not just being user focused, but data driven. It's all about each time we run a program. It's all about setting our goals, setting our research question, what are we gathering data on, how are we gathering this data, how do we create the survey, what does that data tells us, how does this shift our program, how do we hone and iterate our program so that each time we run it, it's iterated, it's changing. Being data driven is all about understanding how we pull this data in, how do we expand that, how do our audiences actually need it, but going back to digital collections, that's all [surveys, testing] going online now. It's analytics and we can pull that data out. All museums need to be data driven for how we are developing things, it's an iterative practice.

Viewing museum-born-digital collections and materials as 'information' and 'data' through a library and archive lens depends on a perspective shift that involves curators and other 'object-based' staff to work along with the information scientists in museums. Galvin remarks:

> Museums tend to be 'curator-first' or public program first and audience engagement around the object. The CMS [collections management system] is just there to help you engage with it whereas libraries and archives are...librarians are the heroes. Through librarianship it's all about how one manages data. So, it's the natural next step, to

understand clearly how one takes that leap into the digital sphere because that is informatics.

How museums fit into user studies on born-digital collections access that is emerging is problematic and warrants further investigation. The key will be to accentuate the evolving relationships among objects information, collections information, research data, description (metadata), and informatics that create relational networks of documentation that users can successfully retrieve and reuse. All of this will come back to the user, their needs, and their ease of accessibility. Practitioners can apply the same concepts to how museums assess users of their growing collections of born-digital materials. According to Jones (2018):

> As documentation becomes more richly interconnected, there is the chance users will become overwhelmed by what [Nicholas] Thomas has called the 'bewildering of relations' that could result. How best to make the resulting data structures available to researchers and a public currently accustomed to search boxes and filters, or to harvesters built around the idea of discrete records, is an area that needs significant attention. (p. 13).

Inevitably, LAM communities of practice and convergence will help shape how user studies begin to address this bewildering of relations – as well as the access barriers that bewilder users. It will require a cultural shift. Not only within LAM existing practices, but in the continued development of cross-disciplinary informatics, digital curation, and instructional technologies that emphasizes user experience research and development education among emerging LAM professionals. Ray (2016) concludes:

> There is evidence that traditional attitudes and practices that limit online access to museum data are changing as the result of user behaviors and growing awareness of the

value of digital data, but educators can also help to promote great alignment of principles and practices among collections-holding institutions. (p. 224)

Conclusion – Communities of Practice and LAM Convergence – The Cultural Shift

"We need to build a culture to do this ... we have to do this, and if we have to do this, let's do it on a small scale so we can sustain it" – Wendy Hagenmaier, 2020

"Leap of faith" – Tessa Walsh. 2020

The user survey investigations presented in this paper, along with open-ended interview responses from the participating LAM professionals, determine that user studies on born-digital collections access have intrinsically impacted access practices that will ultimately improve user experiences. With the significant evidence in current born-digital access scholarship and emerging technologies, standards, and resources driven by progressive field practitioners, user studies are now moving into the forefront of critical discussions. User studies are the natural 'next step' segue. From first addressing the managing of born-digital materials, developing born-digital practices and tools, applying born-digital processing and digital preservation methods, providing access to collections, to best understanding users to improve their experience.

Although there are numerous strategies to change user studies actively, a necessary cultural shift to advocate for user studies must occur. Compelling user studies will become better implemented by:

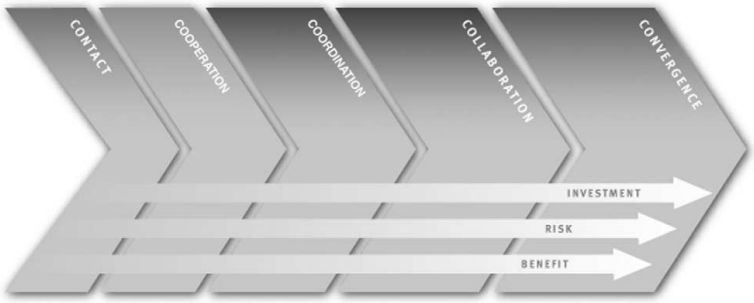
- Investing and participating in LAM local and global communities of practice to share in knowledge exchange and of resources.
- Embedding user studies into LAM educational programs that prepare emerging practitioners with these specific knowledge, skills, and abilities.

- Empowering a culture of user studies on born-digital collections access within LAMs that champions the user experience for the benefit of discoverability.

By embracing these strategies within the practices of PAR&D, producers of user studies on born-digital collections access can transform a cultural shift through the Collaboration Continuum (see Figure 3): "The broad spectrum of collaborative activity ... [to] *convergence*, a state in which collaboration has become so extensive, engrained, and assumed that it is no longer recognized as a collaborative undertaking" (Waibel & Erway, 2010, p. 326).

Figure 3

The Collaboration Continuum Diagram, OCLC



Waibel, G., & Erway, R. (2009, December 1). Think globally, act locally: Library, archive, and museum collaboration. *Museum Management and Curatorship, 24*(4), 323-335. https://doi.org/10.1080/09647770903314704

LAMs can achieve the cultural shift from collaboration to convergence for user studies on born-digital collections access by participating in and sharing resources and scholarship within established communities of practice and organizations. These include the BitCurator Consortium (BCC), the Software Preservation Network (SPN), the Educopia Institute, DLF-BDAWG, and other DLF working groups, the Museums Cohort, Digital Accessibility, and Assessment Interest. The Digital Preservation Coalition (DPC), Museum Computer Network (MCN), MuseWeb, the Society of American Archivists (SAA), and the American Alliance of

Museums (AAM), and numerous other organizations can support resources and scholarship, which can be of value to all LAMs and practitioners.

The cultural shift invites more museum organizations into the library and archive discussion of user studies and born-digital collections access. More LAM inclusivity enables more museum practitioners to view archival born-digital materials and collections data through a library and archival science lens as "relational, interconnected information structures" (Jones, 2018, p. 11). Many museums focus their digital engagement programmatic strategies on data to design programs that are data-driven. Libraries and archives will continue to benefit from this practice using more formal methodologies, data interviews, and data and formative analytics to study their users.

The cultural shift encourages the formation of more User Experience departments, such as at the North Carolina State University Libraries, and recognizing user studies as a valuable practice within job descriptions and work deliverables. Investing in cross-disciplinary collaborations, especially with Human Computer Interaction (HCI) or the cognitive sciences and instructional technologies, can better leverage LAM user studies resources. Offering cross-disciplinary LAM undergraduate or graduate student courses in 'learning experience,' user studies, UX testing, usability studies, evaluative studies and research, data management, and statistics and analytics, better prepares students for emerging user studies practices on born-digital collections access. These curricula will build a more educated workforce to manage born-digital collections beyond the LAM sector and help evolve born-digital collections access scholarship and stewardship.

Finally, the cultural shift includes inviting more researchers working with LAM born-digital collections and practitioners interested in user studies on access to publish their work and

share at conferences to afford and advance the scholarly record. The shift acknowledges a more inclusive community of practice by inspiring collaborations between emerging LAM professionals and seasoned professionals to engage in PAR&D and giving fuller support to these scholars and practitioners in valuing their contributions; to provide the room to experiment together in developing tools and resources and allowances for 'rejecting perfection' in the process. In the wisdom of Dundon:

> We can't be perfect with all of these tools and all of these resources. The only way we can advance them is experimenting and trying out new things. 'Good enough' practices matter. This resonates with me. [It is] the tenor of born-digital archival stewardship. There's a cultural shift happening in that community where people are welcomed, newcomers are welcomed in a way that didn't feel as palpable before. [Reject Perfection.] This value helped me get into this [access practices]. I hope it inspires other people.

Next Steps

"The next step is trying to stay a step ahead ... staying on top of the digital material, of the changing formats ... just a commitment to it" – Cate Peebles, 2020

The following recommendations for transforming the cultural shift for user studies on born-digital collections access:

User Studies Strategies

1. Conduct more LAM user studies concentrated within individual institutions using a small respondent pool. Target participants to 4-6 respondents in a hybrid survey approach. Use 'task testing,' exit surveys, open-ended interviews, researcher observation, usability, and UX testing to identify user pain points.

2. Develop exit interviews that are easily accessible from an online platform such as Google Forms.
3. Arrange one-on-one informal, open-ended interviews and scheduled observations that encourage the researcher to illustrate their access and work with born-digital collections in real-time.
4. Budget resources to pay formal study participants or provide 'incentives' to participate in surveys and testing.
5. Activate and encourage "guerilla" UX testing, which is very informal and designed to approach users on the spot to 'test' a task and does not require formal IRB approval. Work to embed testing that has "blanketed approval." If blanketed approval is not possible, provide guides to working with IRBs for conducting studies so that data may be shareable outside the institution. (Dietz & Waggoner)

User Studies Communities of Practice

1. Continue developing and sharing policies, technologies, standards, resources, and digital forensic and preservation practices regarding born-digital materials processing, which are first required to manage born-digital materials and provide access across LAMs.
2. Provide a series of templates, a "set of vetted resources" (Dietz) available from one institution. Or a convergent website sponsored by an organization that streamlines resources for LAM professionals. Include a series of quick tips, born-digital collections user guides for researchers and staff (Dietz & Dundon). Having vetted resources ensures high-quality templates and resources, so organizations and practitioners do not have to reinvent the wheel, saving

individual institutions time to develop these tools. Share resources. And if an institution cannot share data, share the methodologies (Waggoner).

3. Continue developing and sharing user outreach strategies to identify who is researching with LAM born-digital materials. Target different types of researchers that will shift as born-digital materials become more available, such as investigative journalists, technologists, historians, and those involved in the digital humanities who will access these materials more frequently (Clemens).
4. Include researchers in participatory design of tools used for access, such as incorporating born-digital materials in DAMS for physical or virtual reading rooms or finding aids or in the evaluative testing development of user studies themselves.
5. Provide born-digital terminology dictionaries. Incorporate standardized descriptive data fields and values into CMS, DAMS, and findings aids to enhance "born-digital discovery" (Dundon & Waggoner). Recognize possible "language" barriers and "library and archives jargon" that may exclude users and cause confusion (Walsh).

User Studies Cultural Impact and Action

1. Institutionally embrace the Participatory Archival Research and Development (PAR&D) model and embed it into LAM operations, providing the necessary resources. This includes championing PAR&D practices into courses for both LAM undergraduate and graduate programs.

2. Require statistics, qualitative and quantitative research and analytics, user, evaluation and assessment, usability, and UX studies with data interview practices in LAM undergraduate and graduate programs that are cross-disciplinary in focus.
3. Embed User Experience (UX) programs and departments into LAMs. Create cross-disciplinary LAM consortiums so that IT analysts, technology support staff, and UX testing experts can work with LAM staff to develop and share resources.
4. Include user studies, usability studies, and UX testing into LAM job descriptions as qualifications or required and recommended knowledge, skills, and abilities.
5. Institute a consortium-sponsored or foundation-funded repository where participants can house and share resources, e.g., BitCurator Consortium, Educopia Institute, Open Science Framework, Inter-university Consortium for Political and Social Research (ICPSR). Provide tier-leveled costs for participation so that smaller institutions or individual LAM professionals may join.
6. Increase outreach to LAM professionals for joining born-digital access and user studies working groups such as DLF-BDAWG or self-initiate cross-disciplinary groups within institutions.
7. Encourage opportunities for LAM institutions and practitioners to share their born-digital collections access experiences by publishing case studies or other similar research in various platforms. Participate in cross-disciplinary LAM conferences, seminars, and workshops to share work and sustain interest and continued studies.
8. Inspire a ‘collaboration to convergence’ PAR&D mindset within the LAM community that rejects perfection, welcomes experimentation and embraces

change agent, grassroots efforts to advocate for and advance born-digital access scholarship and stewardship.

9. Invest and provide resources that uphold the values and principles of long-term economic sustainability with both the practitioners and the users in mind.

Glossary

AccessData FTK (Forensic Toolkit) and Imager: A suite of proprietary software developed by AccessData for computer forensics. Typically used in law enforcement but adopted by archivists to analyze the authenticity and integrity of preserved information or extraction of born-digital materials off certain source media. The Imager is a free imaging tool and can "provide enough disk imaging tools" (Prael & Wickner, 2015) for LAMs.

Diplomatics: "The study of individual records, of their genesis, inner constitution, and transmission, and of their relationships with the facts represented in them and with the person or organization producing them, for the purpose of understanding their nature and assessing their trustworthiness" (Duranti, 2008, slide 2).

Digital Diplomatics: Heralded by Dr. Luciana Duranti and the InterPARES (International Research on Permanent Authentic Records in Electronic Systems) project, the term applies the traditional definition of Diplomatics integrated with archival foundational theory that involves digital records and their trustworthiness.

Digital Forensics: "A set of tools and methods for copying and analyzing all of the digital information from a physical medium in such a way that ensures the integrity and authenticity of the information are preserved" (SAA, 2020).

Digital Preservation: The study or application of preserving digital objects, systems, and tools to "maintain the object of preservation for as long as required, in a form which is authentic, and accessible to users" (Brown, 2013, p. 193).

Encoded Archival Description (EAD): "A standard for encoding descriptions of archival resources in XML so that the descriptions can be exchanged, modified, and rendered by computers" (SAA, 2020). The Society of American Archivists and the Library of Congress maintain the standard.

Emulation: Regarding digital preservation, "The ability of a computer program or electronic device to imitate another program or device" (Giaretta, 2011, p. 123). The latest communities of practice project, Emulation as a Service Infrastructure (EaaSI), designed by Yale University, the Software Preservation Network and other organizations, provides a "scalable infrastructure and services for software emulation" (SPN, 2020).

Granular/Granularity: Regarding metadata, "the degree to which data is broken up into its most elemental components" (SAA, 2020) or breaking metadata down into the finest levels of description, mostly directed at the item level.

Hybrid Collections: Collections that include a variety of mediums but primarily of both analog and electronic-digital materials and source media.

Machine Readable Cataloging (MARC): "A data communications format that specifies a data structure for bibliographic description, authority, classification, community information, and

holdings data ... a United States implementation of the Information Interchange Format (ANSI Z39.2" (SAA, 2020).

MPLP "More, Product, Less Process": The archival processing method and mantra developed by archivists Dennis Meissner and Mark A. Greene in 2005 that focuses on "minimal processing to arrange and describe archival series and collections in order to reduce or avoid backlogs" (SAA, 2020).

Migration: Regarding digital preservation, a method of conversion of an 'original' digital object from one format to another in order to preserve it within a more acceptable format for access.

New Media: Any type of information that is digitally produced and delivered. This can include any device to read digital information it that is communicated via a computer or electronic device or produced. New Media Art can fall into this category regarding digital art and other forms of artworks that involve using digital components or are computer-generated.

Time-based Media: Also known as 'electronic' or 'new media or media art,' artworks that are produced and depend on mechanical or electronic, computerized systems and equipment to function. Regarding video, "the essence of the medium is time" – Bill Viola, video artist, Permanent Impermanence.

Virtual Machine (VM): A software system that can emulate other software programs or applications in which a 'host' machine operates separately as a server but can be accessed through a downloaded system through another computer and run virtually. A VM is used to operate digital forensic applications such as BitCurator and Curator's Workbench to prepare digital materials for repository packaging.

Web crawls or crawler: The process of searching, indexing, and archiving content from the Internet. A significant archival method of capturing and preserving websites on a timed schedule. The 'crawler' is a search engine bot. 'Crawling' "is the technical term for automatically accessing a website and obtaining data via a software program" (Cloudflare, 2020).

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Appendix A

DLF Levels of Born-Digital Access: Table View

	Accessibility	Description	Researcher Support & Discovery	Security	Tools
Level 1	Researchers are provided with information on the accessibility of born-digital materials.	Provide required descriptive elements for a collection-level record and at least one descriptive note about the processed digital materials.	Support basic access to and duplication of content. Have a knowledgeable staff member available to provide assistance.	Provide access to open, authentic, virus-free con- tent on a dedicated on-site public access computer with security measures implemented based on local policies.	Provide local access via an on-site public access computer with open and common software to render widely used file formats.
Level 2	Researchers are able to find accessible information and metadata about the materials they need.	Provide required descriptive elements for a multilevel record and specified descriptive notes.	Create and provide access to additional technical documentation. Have multiple staff available to provide assistance. Seek feedback from researchers.	Provide secure remote access to open content using platforms that meet local requirements for secure remote access based on institutional policies and access control needs.	Provide tools to support enhanced access and exploration of content, and software to support evaluation and investigation of files; provide mechanism for semi-mediated distribution.
Level 3	Researchers are able to render/use materials.	Provide metadata that describes, and documents actions taken upon the materials in the col-lection. Provide direct links to digital content.	Provide additional technical guidance and support for emulation and content analysis. Conduct regular assessments of access services and develop new services to fill gaps.	Create additional access controls to support secure on-site or remote access to conditionally restricted materials, utilizing anonymization, redaction, and encryption tools when necessary; perform periodic audits of infrastructure and practices.	Provide remote access and sophisticated tools for exploring, rendering, and interpretation of data; provide hardware and software to support access to legacy/obscure content, including emulation services.

Arroyo-Ramírez, E., Bolding, K., Butler, D., Cobourn, A., Dietz, B., Farrell, J., Helms, A., Henke, K., Macquarie, C., Peltzman, S., Watson, C.T., Taylor, A., Venlet, J., & Walker, P. (2020, February). Levels of born-digital access, version 1. *Digital Library Federation (DLF) Born-Digital Access Working Group*. https://osf.io/af4eq/

Appendix B

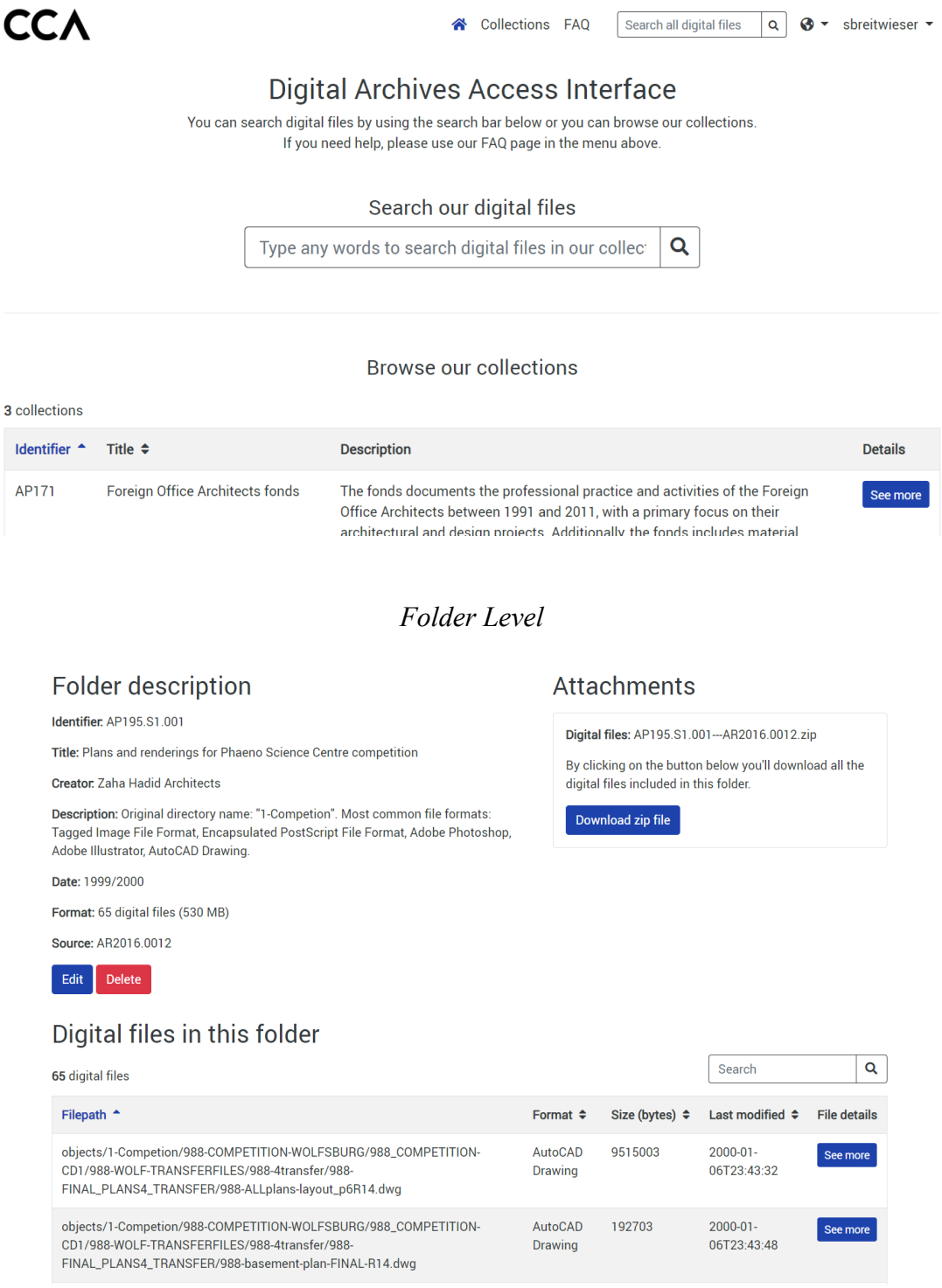
Participatory Archival Research and Development (PAR&D) 'High-Level' Framework

PAR&D	Participatory	Archival	Research	Development
Themes	Collaboration, openness, inclusivity, transparency	Trust, context, education, temporality	Reflection, questioning, methods	Action, change, practice
Strategies	• Create open data for access and reuse • Support research approaches, methods, publications, and platforms that facilitate frequent and informal sharing and lower the barrier of entry into research participation • Include and encourage diverse PAR&D participants, including new professionals and members of underrepresented communities • Foster a culture of documentation • Participate in professional alliances within and beyond libraries, archives, and museums • Create and foster clear, just expectations for professional conduct and inter-personal and professional work	• Reflect throughout the research, development, and practice process in order to reinforce key archival values of trust and integrity • Acknowledge and embrace that changes in archival repertoires (skillsets, tools, education) do not follow a linear trajectory; the practice is temporally mixed, reflecting the intergenerationality of practitioner groups, archival collections, and user communities	• Commit formally to invest time in research at the organizational and professional level • Emphasize iterative reflection and questioning of status quo perspectives and practices • Diversify ways of knowing (e.g., traditional research methods such as surveys and interviews as well as experiential methods such as hackfests) to deepen our understanding of archival practice • Create shared, participatory professional research agendas set and informed by communities beyond the boundaries of any single professional organization • Ensure that the evolving skills required for PAR&D, including reflective practice, are addressed in graduate and professional education programs	• Focus on translating research results directly and quickly into practice; fail forward • Invest in R&D not just because it yields new knowledge (taking a cue from scholarly R&D), but because it is efficient (taking a cue from corporate R&D) and will enable archives to be seen as vital producers within the knowledge economy,[39] yielding longer-term access to cultural heritage • Acknowledge the value of cultural heritage professionals as maintainers of collections and professional communities as well as discoverers of concrete insights that fuel practical progress • Nurture agile professional organizations that facilitate ad hoc groups and communities of practice

Clemens, A., Hagenmaier, W., Meyerson, J., & Appel, R. (2020, April). Participatory archival research and development: The born-digital access initiative. *Provenance, Journal of the Society of Georgia Archivists, 36*(1), 4-24. https://digitalcommons.kennesaw.edu/cgi/viewcontent.cgi?article=1515&context=provenance

Appendix C

Canadian Centre for Architecture (CCA) Digital Archives Interface



Folder Level

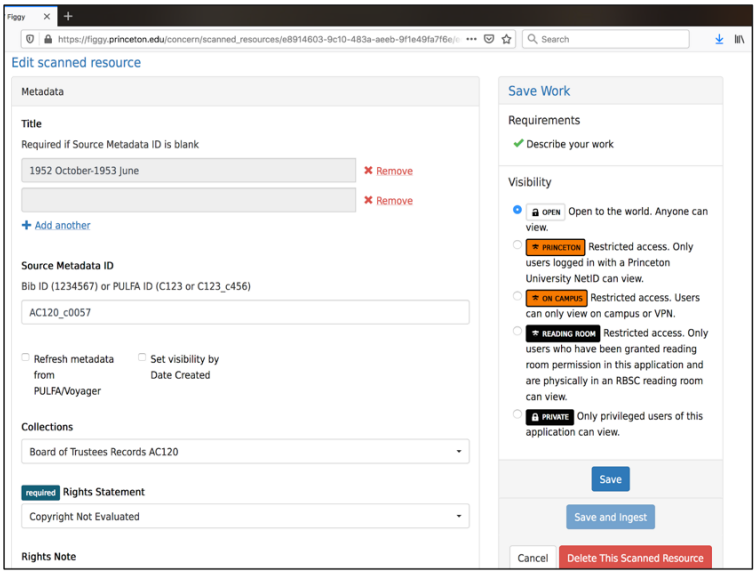
Stewart, K. & Breitwieser, S. (2019, February 14). SCOPE: A digital archives access interface. *Code{4}lib Journal, 43*. https://journal.code4lib.org/articles/14283

Appendix D

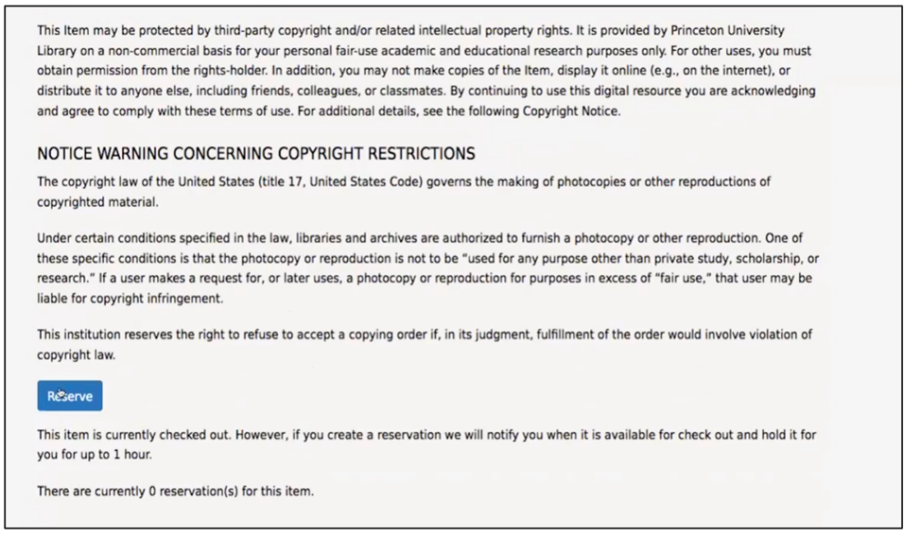
Princeton University's virtual reading room using 'Figgy' – homegrown DAMS that includes access to born-digital materials

Figgy

- Homegrown DAMS originally developed to provide access and long-term preservation to digitized materials
- Expanded to include born-digital after Webspace sunset
- Allows for tiers of mediated access, custom metadata, automated DAO insert to finding aids, viewer for all PDFs, TIFFs, and MP3s
- Other features include OCR and automated metadata extraction from finding aids and catalog



In Development: Controlled Digital Lending



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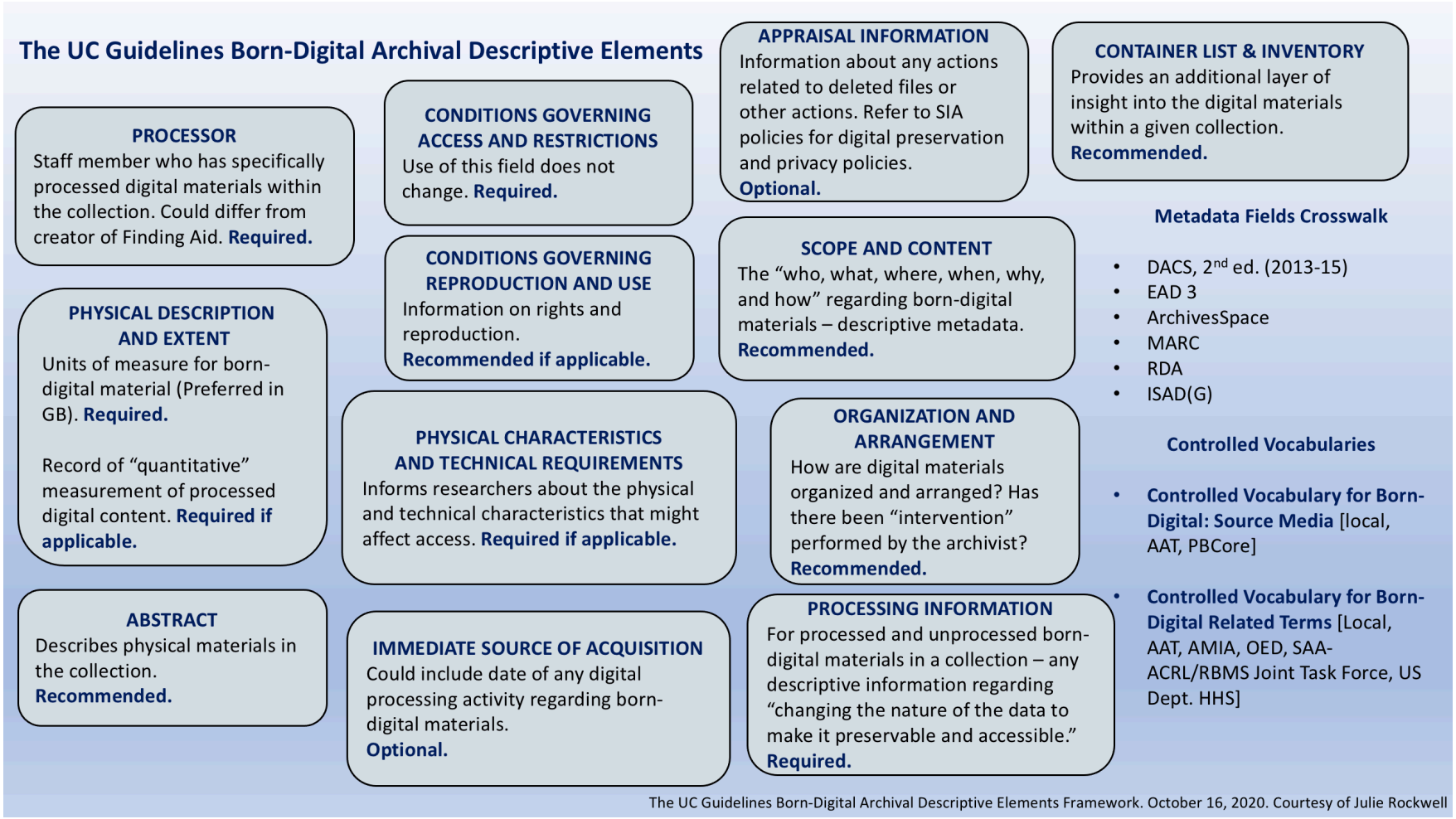
Appendix E

UC Guidelines for Born-Digital Archival Description Framework

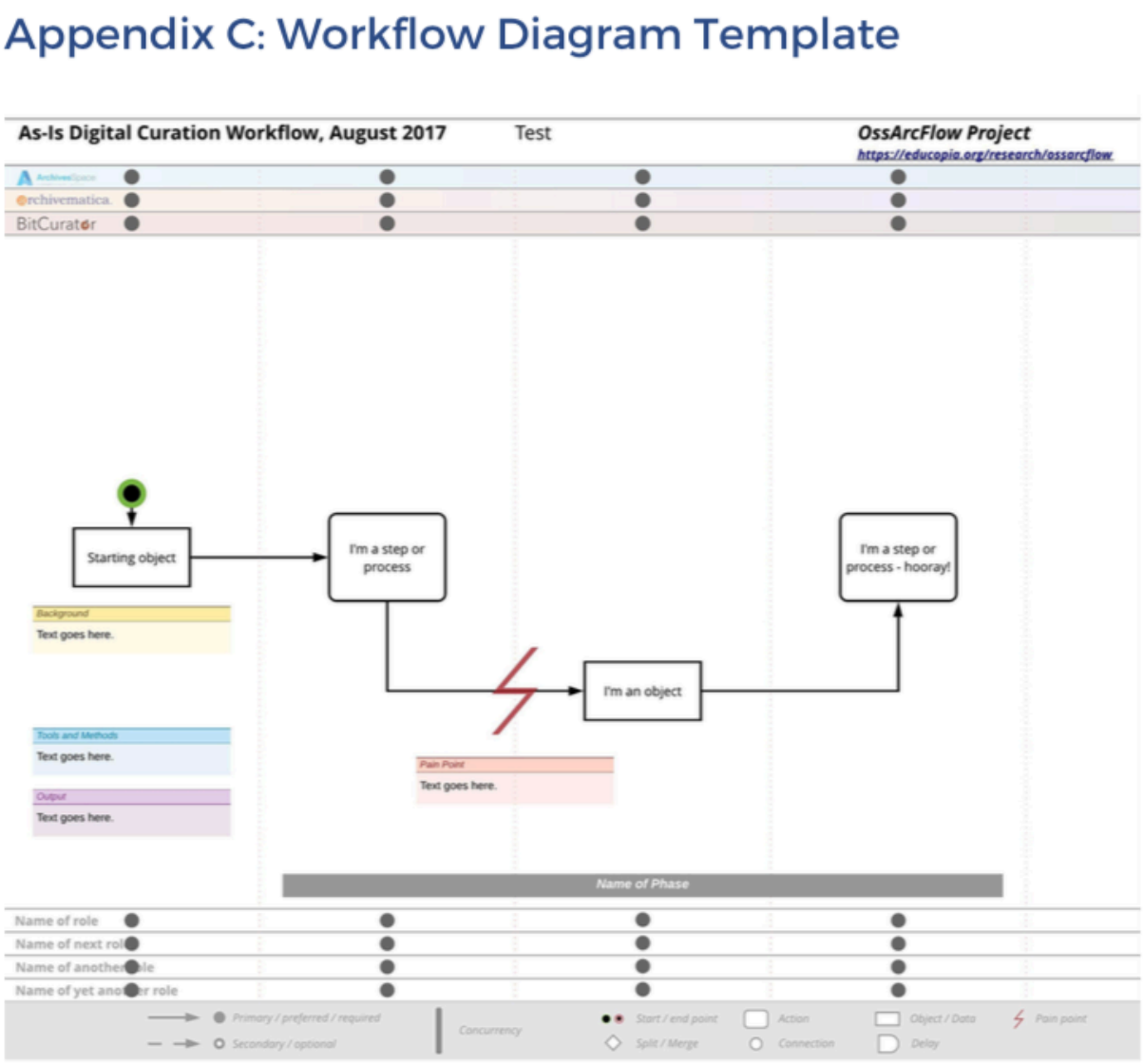


The UC Guidelines Born-Digital Archival Descriptive Elements Framework. October 16, 2020. Courtesy of Julie Rockwell

University of California Systemwide Libraries. (2017, October 26). UC guidelines for born-digital archival description. *UC Office of the President: University of California Systemwide Libraries*. https://escholarship.org/uc/item/9cg222jc

Appendix F

OSSArcFlow Access to Born-Digital Workflow Template, Educopia Institute

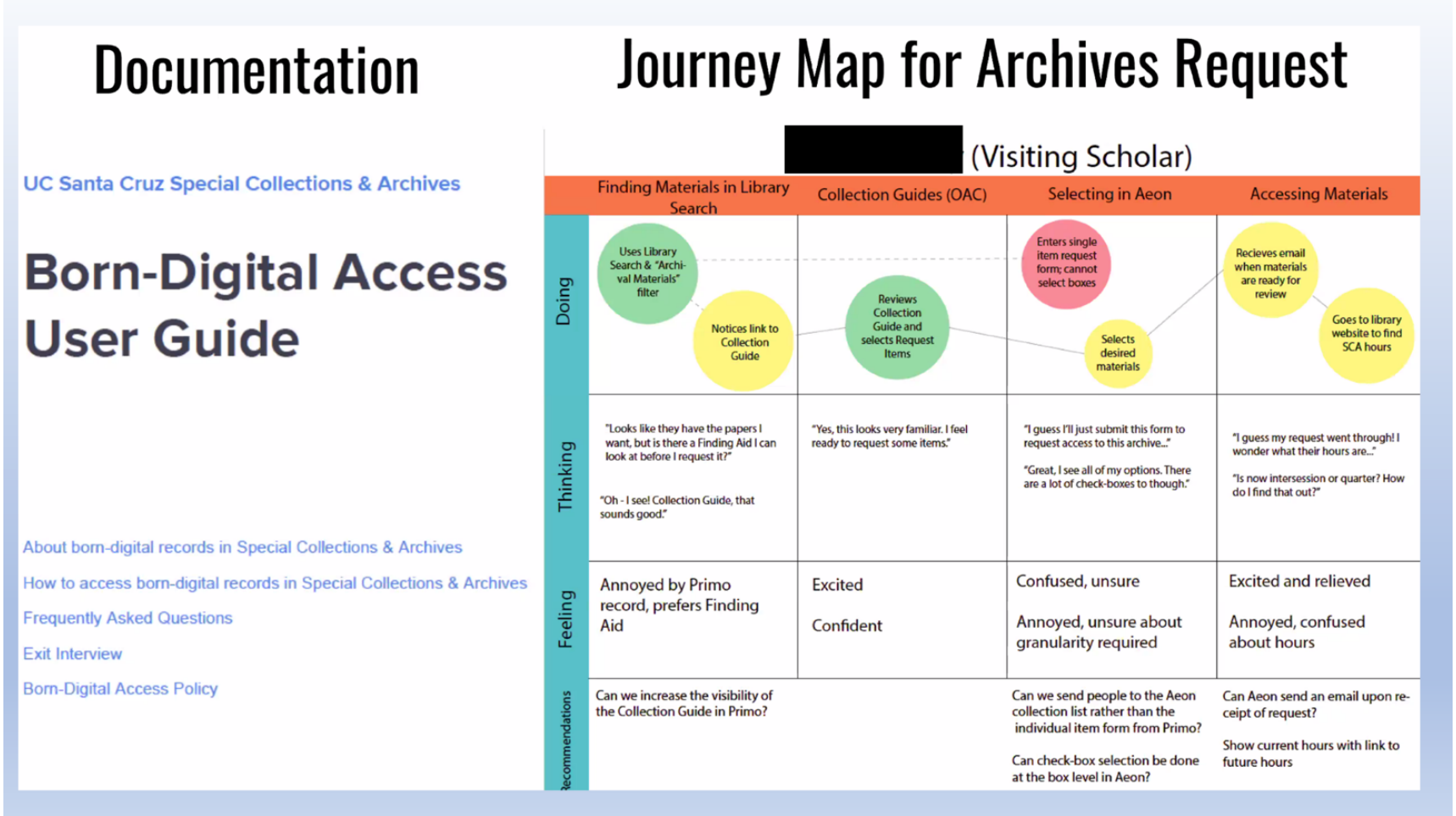


Access a copy of the template in LucidChart here. Note: you may have to create a LucidChart account in order to access this template.

Chassanoff, A., & Post, C. (2020, June 23). OSSArcFlow: Guide to documenting born-digital archival workflows. *Educopia Institute*. https://educopia.org/ossarcflow-guide/

Appendix G

UC Santa Cruz Library Born-Digital Access User Guide and 'Journey Map' for Archives Request



Dundon, K., & Waggoner, J. (2020, October 15). *From request to access: Evaluating born-digital access* [Video and PowerPoint slides]. Virtual BitCurator Users Forum 2020, BitCurator Consortium. https://bitcuratorconsortium.org/forum/#buf20recordings

Appendix H

Open-ended Interview Questionnaire

Questions were tailored according to the respondents' connections to the born-digital collections access surveys, survey outreach, and general LAM digital curation, and preservation scholarship.

1. What impact on born-digital collections access and survey outreach within your institution or in LAMs overall do you identify as significant movements forward that provide for successful user experiences for both the practitioner and the user?

2. Currently, how does your institution benchmark existing practices to measure success? Is there a strategic plan for measuring impact? If so, what is the measuring cycle and how is it implemented?

3. With the considerable increase in organizational policies and standards regarding born-digital materials across LAMs, what gaps or barriers still exist? What strategies can you recommend for building better relationships among LAMs that will benefit improvements to born-digital user access?

4. Regarding survey tools and materials, what is missing that could help improve them? Would a standardized tool that is also flexible for institutions to tailor to their needs be worth developing?

5. If given resources to design and conduct surveys and analysis on a regular basis, what strategies would you use to gain outreach? How could more staff be involved in the survey process with users?

6. What are the 'next steps' for the future of usability studies on born-digital collections access and outreach?

7. Is there any other information you want to share about born-digital collections access that would be of value to my cross-analysis?

Appendix I

Annotated Bibliography

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This article shares the results of the fourth study of the Northwest Digital Archives (NWDA) consortium with the Orbis Cascade Alliance. The consortium shares its perspectives on how to create robust systems that 'integrate digitized archival collections and metadata' within a 'digital delivery system that best optimizes user needs. The Researcher Needs Study focused on nineteen interviews with various types of researchers who contributed to the design concepts, which resulted in considering a Cross-Search and Context Utility (XCU). Although not entirely addressing born-digital materials, this study does provide the precursor to cross-institutional digital delivery systems development on a broad scale to which born-digital materials become accessible through a similar model.

Berdini, A., Macquarie, C., Peltzman, S., & Tasker, K. (2018). Describing digital: The design and creation of a born-digital archival description standard at the University of California Libraries. *Journal of Western Archives, 9*(1), 1-24. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1094&context=westernarchives

A companion piece to the published *UC Guidelines for Born-Digital Archival Description* (2017), this peer-reviewed article describes the development of new-to-the-field born-digital archival description elements, and the guidelines for using them, created by a group of digital archivists across the University of California Libraries

sector. The problem statement responds to a mutually recognized need to provide consistencies in notating descriptive elements, units of measure, and additional source media and born-digital materials information typically not found in archival finding aid content. The authors identify key resources that were consulted in the preliminary steps of their work and share the group's working methodologies. The results are an in-depth look into each of the Guidelines' twelve born-digital archival descriptions, controlled vocabularies for source media and born-digital related terms, a metadata crosswalk, and a sample finding aid.

Carroll, L., Farr, E., Hornsby, P., & Ranker, B. (2011). A comprehensive approach to born-digital archives. *Archivaria,* 72, 61-92. https://open.library.emory.edu/publications/emory:cksgv/

A comprehensive approach to born-digital archives introduces the case study of Emory University's Manuscript, Archives, and Rare Book Library (MARBL) and their hybrid collection of Salman Rushdie's manuscripts and computers. The study describes in great detail of MARBL's approach to the providing access to the born-digital materials on the original source media and within emulations. It also shares the born-digital archives program operations, their processes and workflows, most importantly, their team involving a broad scope of practitioners and scholars in libraries, archives, and information technology.

Davis, S. (2008). Electronic records planning in "collecting" repositories. *The American Archivist, 71,* 167-189. https://doi.org/10.17723/aarc.71.1.024q2020828t7332

This article shares one of the first survey analyses providing baseline information about libraries, archives, and other cultural heritage institutions and their relationship with

working with electronic records and born-digital materials. Davis's investigative lens determines if these 'repositories' are ready to manage these materials successfully using their current archival processes. And, in her observation of the current environment at that time, efforts to addresses managing electronic records and born-digital materials were strong in government sectors and specialized archives communities, but not widespread. Davis concludes the continued research is warranted and a single study cannot speak for the entire field and more practitioners need involvement in these studies.

Erway, R. (2012, August). You've got to walk before you can run: First steps for managing born-digital content received on physical media. *Online Computer Library Center (OCLC) Research*. https://www.oclc.org/content/dam/research/publications/library/2012/2012-06.pdf

Erway's publication offers a comprehensive overview of actionable steps with guiding principles to begin a management program of processing born-digital materials. Erway provides a Technical Steps for Readable Media guide and emphasizes that born-digital materials management is required for successful access to those materials.

Goldman, B. (2011). Bridging the gap: Taking practical steps toward managing born-digital collections in manuscript repositories. *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage, 12*, 11-24. 10.5860/rbm.12.1.343

Goldman's article identifies key research findings that indicate significant 'gaps' in successfully managing born-digital materials such as in effective policies, staff inefficiencies in handling born-digital materials regarding technological expertise and the nuances between analog and born-digital. Goldman offers short-term strategies for doable

application, especially for smaller institutions, and recommendations for donor relations and policy development of born-digital collections.

Lee, C., Kirschenbaum, M., Chassanoff, A., Olsen, P., & Woods, K. (2012). BitCurator: Tools and techniques for digital forensics in collecting institutions. *D-Lib Magazine*. http://www.dlib.org/dlib/may12/lee/05lee.html

This article is the first published introduction to the BitCurator project on the development of the digital forensics tool and accompanying scholarship and methodologies. A project heralded by the School of Information Science (SILS) at the University of North Carolina at Chapel Hill and Maryland Institute for Technology in the Humanities (MITH) at the University of Maryland, the article shares the evolution of the BitCurator community of experts to design and execute the BitCurator tool.

Prael, A.S. (2018, May 4). Centralized accessioning support for born-digital archives. *Code{4}lib Journal, 40.* https://journal.code4lib.org/articles/13494

This case study documents the Yale University Libraries and Museums innovative pilot that created the Digital Accessioning Support Services (DASS), a now permanent centralized service used by eight distinctive LAMs on campus. DASS helps to sustainably accession and prepare thousands of backlogged born-digital materials for ingest into the Preservica Digital Preservation System (DPS). Conversations among unit staff solidified the need for a collaborative approach, which instigated the formation of the Born Digital Archives Working Group (BDAWG) to steward the grant-supported pilot. Prael's work offers a deeper lens into the technical necessities of general born-digital content processing, identifying digital forensics tools to perform essential

functions that strengthen access. which requires persistent and innovative born-digital content management, collaborations, and using resources creatively.

Redwine, G., Barnard, M. Donovan, K. Farr, E., Forstrom, M., Hansen, W., Leighton John, J., Kuhl, N., Shaw, S., & Thomas, S. (2013, October). Born-digital: Guidance for donors, dealers, and archival repositories. *Council on Library and Information Resources (CLIR)*. https://www.clir.org/pubs/reports/pub159/

Published by CLIR, this document provides information regarding the accessioning and processing of born-digital collections from donors to archival repositories. A series of recommendations guide the reader in understanding what effective policies and procedures will ensure that the 'physical and intellectual' well-being of these materials is preserved under optimal conditions. Unique to this resource is that it was developed with no budget and with participants from the UK and across regions in the United States so a variety of collaborative resource tools, such as Google Docs and Dropbox provided communications and each contributor developed their own case studies to align their commonalities that ultimately framed the guide. The guide concludes that born-digital relies on transparent communications among various LAM professionals and donors and dealers for upholding optimal preservation standards.

Shein, C. (2014). From accession to access: A born-digital materials case study. *Journal of Western Archives, 5*(1), 1-42. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1036&context=westernarchives

Shein shares the J. Paul Getty Trust Institutional Archives' story of its first experience in managing a born-digital, hybrid collection from acquisition and processing to ingest and

preservation, in consideration of performing effective, long-term digital curation and regarding optimal practices in digital stewardship. Developing a MPLP approach, the Archives' dedication to preserving the *Pacific Standard Time: Art in L.A. 1945-1980* project highlights the many challenges ensuring optimal, archival management of the collection. Her conclusions highlight the necessity of collaborations and the need for further exploration into the management of born-digital collections, especially how institutions address issues of processing unique materials with limited resources and being flexible to different levels of 'good enough' processing without compromising the authenticity and integrity of the collection.

Sloyan, V. (2016). Born-digital archives at the Wellcome Library: Appraisal and sensitivity review of two hard drives. *Archives and Records: The Journal of the Archives and Records Association, 37*(1), 20-36. https://doi.org/10.1080/23257962.2016.1144504

In this case study, Sloyan recognizes the 'hot topic' of born-digital collections management and how it applies to the Wellcome Library. Sloyan's (2016) studies illustrate that processes are not finite, and many tools reveal issues regarding sensitive data. Sloyan emphasizes that compromises must be made to balance the best options for materials in large collections or in collections where more granular and technical metadata is more useful to the practitioner and user.

Waugh, D., Roke, E.R., Farr, E. (2016). Flexible processing and diverse collections: A tiered approach to delivering born digital archives. *Archives and Records, 37*(1), 3-19. http://dx.doi.org/10.1080/23257962.2016.1139493

Regarding 'various levels of representation,' this article features Emory University's Manuscript, Archives, and Rare Book Library (MARBL) and their Digital Archives

unit's recent work in developing tiered levels of access to their born-digital materials with workflows that are flexible and adaptable without undermining standards and best practices within archival processing. Understanding that processes cannot be applied in a blanket approach, led to their developments in determining processing tiers and access levels, which signify low, average, and high-tiered levels of complexities and standard, emulation, and optimal access levels. The study shares how effective communications are key to creating dialogue among users and supporting users through better preparations in the reading room to better prepare users for accessing the materials and encouraging valuable feedback.

Winters, J., & Prescott, A. (2019). Negotiating the born-digital: A problem of search. *Archives and Manuscripts, 47*(3), 391-403. https://doi:10.1080/01576895.2019.1640753

Winters & Prescott address the influx of born-digital materials created for the Web that are not collected traditional archival collections and cannot necessarily be accessed from web searches, such as Google, so well. The article shares their work investigating avenues of using linked data to better access these unique born-digital archives. Winters & Prescott dive into how web archives and the evolution of web crawls and the complex technical systems and legal challenges that govern what types of content may be accessed and how the 'authenticity' of the materials is stabilized. The use of 'link analysis' and 'digital network analysis' along with linked data packages and artificial intelligence may soon provide more granular access online.

Appendix J

Additional Resources

Born-Digital, Access, and User Studies – Definitions in Context and Born-Digital Collections Access Theoretical and Practical Frameworks

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Butler, D., Clemens, A., Gentry, S., & Williams, C. (2020, October). Literature review. *Digital Library Federation (DLF) Born-Digital Access Working Group (BDAWG) Ideal Access Systems sub-group*. https://docs.google.com/document/d/12dOcvYjh3SV4SIyRz6LU00-AQ5QOYx_li9bdddXDgb8/edit#heading=h.nh8g5g2aloia

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paper, University of North Carolina at Chapel Hill]. Carolina Digital Repository. https://doi.org/10.17615/87b1-h566

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Conclusion – Communities of Practice and LAM Convergences – The Cultural Shift

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